

VOLUME XXXIII

NUMBER 1

JOURNAL  
OF THE  
ARNOLD ARBORETUM  
HARVARD UNIVERSITY

EDITORIAL BOARD

C. E. KOBUSKI, *Editor*

I. M. JOHNSTON

I. W. BAILEY

KARL SAX

JANUARY, 1952



PUBLISHED BY  
THE ARNOLD ARBORETUM OF HARVARD UNIVERSITY  
JAMAICA PLAIN, MASS.

1952



# THE JOURNAL OF THE ARNOLD ARBORETUM

Published quarterly by the Arnold Arboretum of Harvard University.

Subscription price \$7.00 per year. Price of single numbers \$2.00.

Vols. I-XI out of print. Vols. XII-XIII: Price \$3.00 each; single numbers \$1.00 each. Vols. XIV-XXVIII: Price \$4.00 each; single numbers \$1.25 each. Vols. XXIX-XXXIII: Price \$7.00 each; single numbers \$2.00 each.

Subscriptions and remittances should be addressed to the ARNOLD ARBORETUM, JAMAICA PLAIN, MASSACHUSETTS.

---

## CONTENTS OF NO. 1

A TAXONOMIC REVIEW OF THE GENUS ACTINIDIA. By <i>Hui-Lin Li</i> .....	1
STUDIES IN THE BORAGINACEAE, XXII. NOTEWORTHY SPECIES, CHIEFLY ASIAN AND SOUTH AMERICAN. By <i>Ivan M. Johnston</i> .....	62
STUDIES IN THE THEACEAE, XXV. THE GENUS ANNESLEA. By <i>Clarence E. Kobuski</i> .....	79
ERIANDRA, A NEW GENUS OF POLYGALACEAE FROM NEW GUINEA. With one plate. By <i>P. van Royen</i> and <i>C. G. G. J. van Steenis</i> .....	91

---

*Vol. XXXII, No. 4, including pages 303-428, with two plates, Title-page, and Table of Contents, was issued October 15, 1951.*

---

Entered as second class matter April 4, 1940, at the post office at Boston, Massachusetts, under the Act of August 24, 1912.

---

# JOURNAL

OF THE

## ARNOLD ARBORETUM

---

VOL. XXXIII

JANUARY 1952

NUMBER 1

---

### A TAXONOMIC REVIEW OF THE GENUS *ACTINIDIA*

HUI-LIN LI

THE GENUS *Actinidia* was revised by S. T. Dunn in 1911.\* He then recognized 24 species for the genus, and these were arranged in four sections. The genus is limited to eastern and southern Asia, with the main center of development in China. Intensive botanical exploration in eastern Asia during the last forty years has added 26 supposedly new species to the genus, in addition to a few new combinations and other nomenclatural changes. A very much larger series of specimens is now available than at the time of Dunn's study. It is the purpose of this paper to coordinate these later additions with Dunn's treatment and to evaluate his system of classification in the light of our fuller knowledge of the genus.

Among the 24 species enumerated by Dunn, he had not seen material of five, namely *A. giraldii* Diels, *A. holotricha* Finet & Gagnep., *A. davidii* Franch., *A. eriantha* Benth., and *A. fortunatii* Finet & Gagnep. For most of the other species, the number of specimens examined by him were few. With our present more abundant material, the nature of many of the species, including their variation, distribution, and taxonomic delimitation, can be more fully understood and more adequately interpreted.

An account of the early history of the genus is given in Dunn's paper and need not be repeated here. He also presented a discussion of the affinities of the genus, which together with other related genera, was then generally included in the Ternstroemiaceae or Dilleniaceae, and he reached the following conclusion concerning *Actinidia* and closely related genera: "*Saurauja* is inseparable from Ternstroemiaceae, while the remaining two, *Actinidia* and *Clematoclethra*, can be properly excluded from Dilleniaceae." A search into this problem is not herein attempted. It may be mentioned that the prevalent view at present is to establish the family Actinidiaceae for these three genera. In Gilg & Werdermann's treatment (in Engler & Prantl, Nat. Pflanzenf. ed. 2.

\* DUNN, S. T. A revision of the genus *Actinidia* Lindl. Jour. Linn. Soc. Bot. 39: 394-410, map. 1911.



21: 36-47. 1925), the three genera are considered as constituting the family Actinidiaceae, but each represents a distinct subgenus, to which is added a fourth represented by *Sladenia*. The last-named genus, however, is very different from *Actinidia* and *Clematoclethra* and should not be associated with these two. Kobuski (Jour. Arnold Arb. 32: 403. 1951) has retained *Sladenia* in the Theaceae (Ternstroemiaceae), as originally proposed.

In Dunn's paper, full bibliographic citations for each species are given, and these will not be repeated in the present treatment. Aside from the original citation for each species, only literature subsequent to Dunn's paper is here listed. A few misapplied names of taxonomic significance are given, but no attempt is made to list all such records. Nakai (in Bot. Mag. Tokyo 47: 251-259. 1933) has enumerated many such names in synonymy, particularly with regard to Japanese plants; I think that, at least in some cases, this contributes little to the proper understanding of the species concerned.

Dunn's key to the species is constructed on a very sketchy basis, with only one character to each item, and in general it is unsatisfactory. The different species are enumerated but not described, which renders attempts to use his account for identification purposes rather difficult. He divides the genus into four sections, giving particular emphasis to the degree of pubescence, shape of ovary, and presence or absence of lenticels on the fruit. After reviewing all the species, I find it desirable to modify his system somewhat. A very important and fundamental character of the genus, namely, the structure of hairs on the leaves, was neglected by Dunn. This is far more significant in the differentiation of the species-groups than such relative characters as the degrees of pubescence and the shape of the ovary. Both stellate-haired and simple-haired species were included in his section Vestitae. This section is here divided into two, Stellatae for species with stellate hairs and Strigosae for those with simple hairs. For the glabrous or nearly glabrous species, the section Maculatae of Dunn for species with spotted fruit is retained. For species with unspotted fruit, Dunn originally proposed two sections, Ampulliferae for those with bottle-shaped ovary, and Leiocarpae for *A. kolomikta* Maxim., a species with cylindric ovary. However, this is also not a fundamental character, as such a species as *A. tetramera* Maxim. has the ovary intermediate in shape. Thus these two sections are now combined into one, Leiocarpae. As a result there still remain four sections in the genus, but they are modified in circumscription as compared with Dunn's classification.

The present study accounts for 36 species and a number of varieties. Three species, six varieties, and one form are described as new, and several new combinations are proposed. Many synonyms are listed for the first time, and the species and varieties are described.

The species of *Actinidia*, being all climbing or straggling plants, are, like most other woody vines, very variable in vegetative structures. They are dioecious plants, and often there is a slight vegetative dif-



ference between staminate and pistillate individuals, though rarely of a sharp or striking nature. Such differences, if pronounced, will be mentioned in the descriptions. It appears that *Actinidia* is in general more variable in the individual plant than most other ligneous vines; shoots from the same plant borne at different seasons often bear very different leaves, variable in pubescence as well as in shape. The large number of synonyms indicates the lack of appreciation of this fact on the part of some of the describing taxonomists.

Dunn happily had the opportunity of collecting and studying *Actinidia* in the field, and so his judgments are mostly sound and reliable. He calls special attention to the variable nature of this genus, remarking: "The long arching shoots which appear during the spring and summer months give rise in the following year to secondary branches bearing leaves which are often strikingly different in shape and character from those on the primary stems—a point which will explain some anomalies in the series of specimens in herbaria." As a matter of fact, a number of supposedly new species of later years are based on single anomalous specimens.

The distribution pattern is instructive in revealing the nature of the species in *Actinidia*. Most of the species appear to be polymorphic and to occur in very wide areas, comprising several varieties, morphologically slightly different and geographically often of contiguous but distinct areas. The type species of the genus, *A. callosa* Lindl., is the most variable and also the widest in distribution. It is one of the two that extend from temperate Asia to the tropical regions of Malaysia, the other being *A. latifolia* (Gardn. & Champ.) Merr., which is less variable in nature. All other species of the genus are primarily of the hills or mountains of temperate regions. Those of wider ranges, extending from Japan through northeastern Asia to western China, are *A. polygama* (Sieb. & Zucc.) Maxim., *A. arguta* (Sieb. & Zucc.) Planchon, and *A. chinensis* Planchon. Geographical varieties of slight morphological differences are recognizable in all these species. The majority of the species are of less wide range and less variable nature, occurring in Japan, Taiwan, Tonkin, northeastern India, and in all temperate and subtropical provinces of mainland China. Most of them occur in southwestern China, which is the present center of development of the genus. The species are generally common plants in the thickets of the region and occupy fairly broad ranges. Only a few, as records stand at present, are of very limited ranges, such as *A. rudis* Dunn and *A. rubricaulis* Dunn of southern Yunnan and the three new species herein proposed, but future explorations may prove that they are also of wider distribution.

In citing specimens, the general order of north to south is followed. An attempt has been made to standardize the geographical place names of China, which are very confusing on field labels as well as in botanical literature. With the exception of a few which cannot be deciphered, which will appear in parentheses, all names follow those



given in "Gazetteer of Chinese Place Names based on the Index to V. K. Ting Atlas," June 1944, published by the Army Map Service, Washington, D. C.

*Actinidia* is of economic importance because of the fruits. *Actinidia chinensis* and *A. arguta*, well known as *Yang-tao* in China, have long been used for their edible fruits, which have a greenish pulp of pleasant acid taste. The fruits are collected from wild plants. *Actinidia arguta* is common in northern China while *A. chinensis* is especially common along the Yangtze valley. Many other species have similarly edible fruits. Recent efforts in introducing these species into cultivation and in improving their products are highly desirable and commendable. *Actinidia chinensis*, with its densely hairy leaves and large yellowish flowers, is also highly ornamental. *Actinidia polygama* and *A. kolomikta* have very decorative leaves variegated with white or pinkish blotches and have become desirable ornamental plants.

The material used in this study has been assembled from the following herbaria, to whose curators the writer is indebted for their generosity in permitting the use of specimens. Corresponding abbreviations are used in the citation of specimens. Arnold Arboretum (A); Gray Herbarium, (GH); New York Botanical Garden, (NY); U.S. National Herbarium, (US).

This study was carried on in the Department of Botany of the U. S. National Museum, Smithsonian Institution, to whose officials grateful acknowledgment is made for their kindness in placing the library and herbarium facilities at my disposal. The writer wishes to express especially his thanks to Dr. A. C. Smith, Curator of Phanerogams, for his kindness in reading the manuscript.

## ACTINIDIA

***Actinidia*** Lindley, Nat. Syst. ed. 2. 439. 1836; Benth. & Hook., Gen. Pl. 1: 177. 1862.

TYPE SPECIES: *A. callosa* Lindl.

Climbing shrubs, glabrous, strigose, or tomentose, the indumentum of stellate or simple hairs; pith solid or lamellate; bark often with linear lengthwise lenticels; winter buds very small, enclosed in the swollen base of the petiole. Leaves simple, alternate, usually long-petiolate, serrate or dentate, rarely entire, penninerved, the costa usually sulcate, the veinlets reticulate, usually in cross bars; stipules minute, obsolete or absent. Flowers white, yellow, or reddish, polygamous or dioecious, usually 5- or 4-merous, in axillary often pseudoumbellate cymes of few or many flowers, sometimes solitary; bracts generally present, minute, 1 or 2 at the apex of the peduncles. Sepals 5, rarely 2-4, imbricate, rarely valvate, free or slightly connate at the base, persistent. Petals 5, rarely 4 or more than 5, convolute, thin. Stamens numerous, in pistillate flowers usually with shorter filaments and smaller sterile anthers; filaments slender; anthers versatile, at-



tached at the middle, reflexed in bud, usually divaricate at base, dehiscing lengthwise, yellow, brown, or purple. Disc absent. Ovary free, superior, tomentose or glabrous, ovoid, cylindrical, or bottle-shaped, many-celled; ovules attached on the central axis; styles many (15–30), free, persistent, radiating, elongating after flowering, the tip stigmatic, excurrent; rudimentary ovary in staminate flowers very small, with minute styles. Fruit a berry, glabrous or sometimes hairy, globose or oblong, spotted with lenticels or not, containing raphides. Seeds numerous, small, biconvex, oblong, immersed in pulp; testa cartilaginous, reticulate-pitted, dark when dry; albumen copious; embryo comparatively large, cylindrical, straight, the cotyledons short.

About 36 species from Sakhalin and eastern Siberia, Japan, and China to the Himalayas and Malaysia; the majority of the species are found in western to eastern and southern China.

#### SYNOPSIS OF THE SECTIONS.

Sectio I. **Strigosae** sect. nov. (Vestitae Dunn, p. p.)

Caulis et petioli longe strigosi, foliis plus minusve setosis, baccis maculatis.

Sectio II. **Maculatae** Dunn.

Caulis et petioli plerumque glabri, foliis glabris, baccis maculatis.

Sectio III. **Leiocarpae** Dunn (*Ampulliferae* Dunn).

Caulis et petioli glabri, foliis glabris, baccis emaculatis.

Sectio IV. **Stellatae** sect. nov.

Planta plus minusve tomentosa; indumento sub folio stellato, baccis glabris vel hirsutis, maculatis.

#### KEY TO THE SPECIES.

- A. Plants glabrous or hairy, the pubescence on the under surface of the leaves when present simple, not stellate.
- B. Stems, especially young shoots, and sometimes petioles covered with yellowish or brownish strigose hairs; leaves more or less setose on one or both surfaces (Sect. Strigosae).
- C. Mature leaves more or less densely setose or strigose above, the bases rounded to cordate.
- D. Leaves cordate; petioles long, 3–7.5 cm. in length.
  - E. Leaves ovate; sepals puberulous without ..... 1. *A. rudis*.
  - EE. Leaves obovate; sepals glabrous without ..... 2. *A. rubus*.
- DD. Leaves oblong-lanceolate, not cordate; petioles short, about 1–1.5 cm. long. .... 3. *A. melliana*.
- CC. Mature leaves glabrous or very sparsely hairy above.
- D. Leaves ovate to broadly ovate, generally less than 1–1/2 times as long as broad, the base rounded to cordate, the lower surface usually strigose, not glaucous, the veins or main veinlets ending distinctly in the marginal teeth.
- E. Petioles long, slender, 5–8 cm. long; veinlets subconspicuous. .... 4. *A. holotricha*.



- EE. Petioles short, 1.5–3 cm. long; veinlets conspicuous, strongly raised below ..... 5. *A. petelotii*.
- DD. Leaves narrowly ovate to oblong-lanceolate, generally two or more times as long as broad, the base cuneate, rounded to cordate, the upper surface glabrous, not strigose, the lower surface glabrous or not, the veins or veinlets strongly anastomosing.
- E. Leaves ovate, slightly coriaceous, the base rounded to distinctly cordate; petioles short, 2–3 cm. long.
  - F. Leaves dark above, pale beneath, the base distinctly cordate; petioles very short, to 2.5 cm. long ..... 6. *A. henryi*.
  - FF. Leaves concolored, the base rounded, not cordate; petioles 2.5–3 cm. long ..... 7. *A. strigosa*.
- EE. Leaves oblong-lanceolate, rarely ovate, chartaceous, the base cuneate to rounded, rarely cordate; petioles usually long, over 2 cm. in length.
  - F. Leaves dark above, pale and glaucous beneath, the base cuneate to narrowly rounded, never cordate (S. W. China). ..... 8. *A. hemsleyana*.
  - FF. Leaves concolored, the lower surface green, not glaucous, the base broadly rounded to cordate (Taiwan). ..... 9. *A. arisanensis*.
- BB. Stems and petioles nearly always glabrous; leaves generally glabrous, or sometimes sparsely setose along the veins or pubescent in the vein-axils on the lower surface, rarely thinly tomentose beneath along the veins.
- C. Fruit not spotted with pale lenticels; ovary cylindric to bottle-shaped, strictly glabrous (Section *Leiocarpae*).
  - D. Ovary cylindric; pith brown, lamellate ..... 10. *A. kolomikta*.
  - DD. Ovary bottle-shaped, rarely cylindric; pith white or brown, solid or lamellate.
    - E. Pith solid, white, rarely slightly lamellate in the center.
      - F. Calyx of 5 distinct sepals, imbricate; pith large, solid, white. .... 11. *A. polygama*.
      - FF. Calyx of 2 or 3 sepals, valvate; pith small, solid, white, or rarely slightly lamellate. .... 12. *A. valvata*.
    - EE. Pith lamellate, brown or sometimes white.
      - F. Leaves small, rarely large, elliptic to oblong-ovate, to 10 cm. long and 5.5 cm. broad; petals not brownish at base; anthers yellow.
        - G. Flowers 4-merous, rarely 5-merous, white, sometimes tinged with pink. .... 13. *A. tetramera*.
        - GG. Flowers 5-merous, white tinged with red especially toward the margins. .... 14. *A. maloides*.
      - FF. Leaves small or large, elliptic to ovate; petals usually brownish at base; anthers purple.
        - G. Leaves small, narrower, to 9.5 cm. long and 4.5 cm. broad.
          - H. Leaves not glaucous beneath. .... 15. *A. kwangsiensis*.
          - HH. Leaves glaucous beneath.
            - I. Leaves thicker, shorter, and broader, ovate, to 7 cm. long and 4.5 cm. broad; pith brown, lamellate to nearly



- solid; petals usually brownish at base; fruit larger, about 2.5 cm. across (W. China). . . . . 16. *A. melanandra*.
- II. Leaves thinner, longer, and narrower, ovate to oblong-lanceolate, to 9.5 cm. long and 4.3 cm. broad; petals not brownish at base; fruit smaller, about 1.5 cm. across (Japan) . . . . . 17. *A. hypoleuca*.
- GG. Leaves larger, broader, over 8 cm. long and 4.5 cm. broad.
- H. Leaves elliptic to elliptic-oblong, the serrations appressed; fruit obovoid or oblong, purple; pith white (S. W. China) . . . . . 18. *A. purpurea*.
- HH. Leaves broadly ovate, the serrations sharp, spreading; fruit subglobose, greenish; pith white or brownish (Japan, Korea, N. China, Liukiu) . . . . . 19. *A. arguta*.
- CC. Fruit spotted with pale lenticells; ovary slightly to densely pubescent at first, becoming glabrate or pubescent when mature.
- D. Leaves very narrow, 3 or more times as long as broad; ovary soon glabrate.
- E. Leaves cuneate to subrounded at base; flowers whitish. . . . . 20. *A. rubricaulis*.
- EE. Leaves distinctly cordatulate at base; flowers red. . . . . 21. *A. fortunatii*.
- DD. Leaves broader, twice or less as long as broad; ovary pubescent.
- E. Flowers red; leaves 1-1/2 times or more as long as broad.
- F. Leaves coriaceous, the veins indistinct, the base acute to acuminate (Szechuan, Kweichow, Yunnan) . . . . . 22. *A. coriacea*.
- FF. Leaves membranaceous to chartaceous, the veins distinct, the base auriculate-cordate (Kwangsi). . . . . 23. *A. asymmetrica*.
- EE. Flowers white or yellow; leaves 1-1/2 times or less as long as broad.
- F. Flowers yellow; pith large, white, lamellate; leaf-bases broadened.
- G. Leaves white-pubescent above, membranaceous. . . . . 24. *A. pilosula*.
- GG. Leaves thinly chartaceous, glabrous or sparsely setose above, not pubescent.
- H. Leaves with numerous distinct parallel cross bars in the veinlets, these strongly raised below, the lower surface not glaucous. . . . . 25. *A. venosa*.
- HH. Leaves with less conspicuous veinlets, the lower surface strongly glaucous. . . . . 26. *A. trichogyna*.
- FF. Flowers white; pith small, brown, lamellate or solid and orange-colored; leaf-base narrowed.
- G. Pith small, brown, lamellate; flowers small, about 1 cm. across; leaf-margins subentire to inconspicuously mucronulate.
- H. Leaves subcoriaceous, larger, over 6 cm. long and 3 cm. broad, not glaucous (Kwangsi) . . . . . 27. *A. glabra*.
- HH. Leaves chartaceous, smaller, scarcely to 6 cm. long and 3 cm. broad. . . . . 28. *A. sabiaefolia*.

- GG. Pith light orange-colored, solid or rarely slightly and irregularly lamellate; flowers larger, about 2 cm. across; leaf-margins serrulate, rarely subentire. . . . . 29. *A. callosa*.
- AA. Plants glabrous or hairy; leaves more or less densely tomentose with stellate hairs on the lower surface (Section Stellatae).
- B. Inflorescence large, 10-flowered or more, the peduncles 2-3 times branched; fruit glabrate. . . . . 30. *A. latifolia*.
- BB. Inflorescence smaller, 1-5 (rarely to 10-) flowered, the peduncles once-branched or not branched; fruit glabrous to hairy.
- C. Leaves large, oblong to broadly ovate or orbicular, over 7 cm. long and 4 cm. broad, rounded or cordate at base; stellate tomentum on under surface of the leaves not appressed; fruit large, more than 2.7 cm. long or across, hairy or glabrate.
- D. Leaves broadly ovate to orbicular, to 1-1/2 times as long as broad; indumentum whitish; fruit large, about 3 cm. across, densely hirsute or villose.
- E. Young shoots villose; leaves coriaceous, acute to acuminate, about 1-1/2 times as long as broad; flowers purplish. . . . . 31. *A. eriantha*.
- EE. Young shoots setose; leaves chartaceous, truncate to emarginate, rarely acute to short-acuminate, usually as long as broad; flowers white to yellowish. . . . . 32. *A. chinensis*.
- DD. Leaves ovate to ovate-oblong, about 2 times as long as broad; indumentum brownish; fruit small, about 2 cm. across, glabrate; flowers white. . . . . 33. *A. fulvicoma*.
- CC. Leaves small, ovate-lanceolate, to 7 cm. long and 3 cm. across, strongly cuneate at base; stellate tomentum on under surface of leaves appressed; fruit very small, scarcely 1 cm. long, glabrous; flowers greenish. . . . . 34. *A. lanceolata*.
- Imperfectly known species. . . . . 35. *A. kiusiana*.
- . . . . . 36. *A. longicauda*.

1. ***Actinidia rudis*** Dunn in Jour. Linn. Soc. Bot. **39**: 408. 1911.

Large climbing shrubs; stems and petioles densely rigid-strigose, the hairs brown to light brown or yellow; pith white, lamellate. Leaves chartaceous, ovate, 12-15 cm. long, 7.5-9.5 cm. broad, acute to acuminate at apex, auriculate-cordatulate at base, the margins minutely denticulate, sparsely to densely strigose above, densely strigose along the costa, veins and veinlets beneath, the upper surface dark, the lower paler, the costa and veins slender, inconspicuous above, raised and subconspicuous beneath, the veinlets reticulate, inconspicuous, the secondary veins about 9-11 per side, straight ascending, anastomosing; petioles variable in length, 1.5-7 cm. long, densely strigose. Inflorescence densely fasciculate, 3-5-flowered, densely ferruginous-tomentose; pedicels about 5 mm. long. Flowers white; sepals 5, ovate, about 3 mm. long and 2 mm. broad, acute at apex, slightly puberulous without; petals 5, oblong-ovate, 5-6 mm. long, 3-4 mm. broad, rounded at apex; stamens numerous, the filaments about 2 mm. long, the anthers yellow, linear, about 1 mm. long, rounded at apex, slightly sagittate at base; ovary oblong densely villose, the styles about 2 mm. long. Fruit



cylindric to oblong, to 1.7 cm. long and 1 cm. across, slightly tomentose to glabrescent, lenticellate.

Southwestern China, in southern Yunnan only, in mountain forests and in ravines, at altitudes of about 1200–1650 meters. Flowers white, May–June.

CHINA: Yunnan: Meng-tzu, *A. Henry* 11307 (A, NY, US, ISOTYPES); P'ing-pien Hsien, *H. T. Tsai* 55137, 55205, 55429, 60073A, 60765, 61052, 61944 (A).

Henry originally cited 2 collections, *Henry* 11307 and 11335, both fruiting specimens. These were first included in *A. henryi* by Dunn. Subsequently he established the species *A. rudis*, basing it on these two collections. Flowering materials are now available in *Tsai* 55205 and others. The species is distinct in its yellow to light brown strigose hairs on the leaves and stems and in the auriculate-cordatulate leaf-bases.

2. ***Actinidia rubus*** Lév. in Rep. Sp. Nov. 12: 282. 1913, Cat. Pl. Yün-Nan 270. 1917; Rehder in Jour. Arnold Arb. 15: 97. 1934.

Climbing shrubs; branches grayish, sulcate, densely brownish-strigose, with pale lenticels; pith white, small, lamellate. Leaves chartaceous, obovate to obovate-oblong, shortly but distinctly acuminate at apex, broad and cordatulate at base, the margins irregularly setose-serrulate, the teeth long or short, spreading, the upper surface dark, sparsely scattered-strigose, the lower surface paler, strigose along the costa and veins, the costa and veins subconspicuous above, distinct and elevated beneath, the secondary veins about 7–9 per side, straight-ascending, the veins or their main branches ending in the longer marginal teeth, the veinlets reticulate, subconspicuous above, with more distinct cross bars beneath; petioles slender, 5–6 cm. long, densely strigose. Flowers solitary or few-fascicled, yellow; pedicels 1–1.3 cm. long, strigose; sepals 5, ovate, unequal, to 6 mm. long and 3.5 mm. broad, acute to acuminate at apex, glabrous without; petals 5, obovate, more or less unequal, 10–11 mm. long, 5–7 mm. broad, rounded at apex; stamens numerous, the filaments slender, about 4 mm. long, the stamens yellow, about 1.2 mm. long, acute at apex, sagittate at base; ovary ovoid, about 2.5 mm. long, densely pubescent, the styles about 3 mm. long. Fruit unknown.

In southwestern China, in northern Yunnan only. Flowers yellow, June.

CHINA: Yunnan: Chao-t'ung, *E. E. Maire* s. n. (A, fragments of TYPE).

The material on hand is more or less fragmentary, but no additional material is available. The species appears to differ from the closely related *A. holotricha* Finet & Gagnep. mainly in the obovate leaves with spreading teeth and in the glabrous sepals.

3. ***Actinidia melliana*** Hand.-Mazz. in Anz. Akad. Wiss. Wien, Math.-Nat. 59: 57. 1922, in Beih. Bot. Centralbl. 48(2): 306. 1931; Merr

in *Lingn. Sci. Jour.* 7: 315. 1929; Merr. & Chun in *Sunyatsenia* 2: 283. 1935; Chun in *Sunyatsenia* 4: 190. 1940.

Climbing shrubs to 10 m.; branches, inflorescences, and petioles densely covered with long rigid brown hispid hairs to 8 mm. in length; pith white, lamellate. Leaves membranaceous to chartaceous, persistent, oblong to ovate or obovate-oblong, 8–18 cm. long, 2.5–8 cm. broad, shortly acuminate at apex, broadly rounded and distinctly cordatulate at base, with brown-hirsute hairs on both surfaces when young, becoming scattered hispid-hirsute above, glabrous throughout or with hirsute hairs along the costa and veins beneath, often glaucous, the margins entire, with numerous sharp rigid pointed hairs, the costa and veins slender, slightly conspicuous above, distinct and raised beneath, the secondary veins about 6 or 7 per side, arcuately ascending, anastomosing near the margins, the veinlets reticulate, subconspicuous on both surfaces; petioles short, 10–15 mm. long, more or less terete, densely hirsute. Inflorescences in axillary cymes, about 10-flowered, subsessile, shortly dichotomously branched, densely brown-hirsute; pedicels slender, to 12 mm. long; bracts subulate, 4–5 mm. long, elongating to 6 mm. in fruit. Flowers white; sepals oblong-ovate, obtuse to acute at apex, 4–5 mm. long, hirsute without; petals white, ovate to obovate, rounded to acute at apex, 8–9 mm. long, 6–7 mm. wide; stamens numerous, the filaments 2 mm. long, the anthers 1 mm. long, sagittate-ovate; ovary subglobose, densely hirsute. Fruit strigose-hirsute to glabrescent when mature, oblong, 16–22 mm. long, 11–15 mm. across, strongly verrucose, with small white rounded lenticels; styles persistent, to 3 mm. long.

Southern China (Kwangsi, Kwangtung, southern Kiangsi, and Hainan), in forests from 800 to 1350 meters. Flowers white, June.

CHINA: Kiangsi: Lung-nan Hsien, *S. K. Lau* 4429 (A, US). Kwangtung: Lung-tau Mountain, *R. Mell* 22 (A, ISOTYPE), *Canton Christ. Coll.* 12085 (US), 12175 (NY, US). Hainan: "Fan Yah," *N. K. Chun & C. L. Tso* 44219 (A, NY, US).

This species is a distinct one, strongly characterized by its long indumentum and the oblong distinctly cordatulate leaves, green or glaucous beneath. The leaf-margins are entire in general appearance, the very fine teeth appearing as pointed rigid hairs along the straight edge of the leaves. The stems as well as the leaves and inflorescences are covered by very long brown hispid hairs. The hairs on the leaves, however, vary greatly in density. Sometimes these hairs are present on both surfaces, distributed all over on the costa, veins, and veinlets. At other times, they may be present all over the upper surface but only very sparsely so on the costa and a few veins on the lower surface. As the leaves advance in age, they apparently become more glabrous and more glaucous on the under surface.

The species is evidently more closely related to *A. hemsleyana* Dunn than to any other. It is, however, readily distinguished by its denser,



longer hairs and its distinctly cordate leaf-base. It also has a more southerly range.

4. **Actinidia holotricha** Finet & Gagnep. in Bull. Soc. Bot. France **52**: Mém. **4**: 18, t. 3. 1905 (Contr. Fl. As. Or.); Dunn in Jour. Linn. Soc. Bot. **39**: 407. 1911.

Climbing shrubs; branches and petioles covered with sparse brown hispid hairs; pith white, lamellate. Leaves membranaceous to thinly chartaceous, broadly oblong-ovate, 9–13.5 cm. long, 6–7.5 cm. broad, short- to long-acuminate at apex, rounded to truncate at base, the margins sharply and finely denticulate, the teeth ascending, sparsely to densely setose along the costa and veins on both surfaces when young to nearly glabrous when mature, the lower surfaces slightly paler, the costa and veins slender, sub-conspicuous above, distinct and raised beneath, the secondary veins about 7 or 8 per side, straight-ascending, the veins or main branches ending in the marginal teeth, the veinlets reticulate, inconspicuous above, subconspicuous beneath; petioles long, slender, terete, 5–8 cm. long, sparsely strigose. Inflorescences glabrate or very sparsely strigose, shortly branched; pedicels 3–10 mm. long, slender. Flowers yellow (?); sepals ovate, obtuse, 5–6 mm. long, more or less puberulous without; petals oblong-obovate, 10–11 mm. long, 7–8 mm. broad, rounded at apex; stamens numerous, the filaments to 4 mm. long, the anthers yellow, sagittate-ovate; ovary subglobose, densely hirsute. Fruit unknown.

Southwestern China (Yunnan and southwestern Szechuan), at altitudes of about 1400–2000 meters. Flowers yellow (?), May–June.

CHINA: Szechuan: Ma-pien Hsien, *F. T. Wang* 23086 (A). Yunnan: Ping-pien Hsien, *H. T. Tsai* 60483 (A), 62642 (A).

This species was based originally on a Delavay collection from "Outchay," which was not examined by Dunn. I suspect this type locality is Hui-tse (Tong-ch'üan), in northeastern Yunnan. The specimens here referred to this species are from nearby localities in Szechuan and Yunnan. They are more or less fragmentary or sterile specimens.

5. **Actinidia petelotii** Diels in Notizbl. Bot. Gart. Berlin **11**: 213. 1931.

Tall climbing shrubs; stems slender, the branches grayish, more or less striated, the young branchlets long and densely ferrugineous-strigose; pith large, white, lamellate. Leaves chartaceous, ovate, about 9–14 cm. long, 6–9 cm. broad, long-acuminate at apex, cordate to subcordate at base, the margins callose-serrulate, the upper surface green, glabrous or very sparsely setose along the veins, the lower surface paler, densely to sparsely setose along the costa and main veins, otherwise glabrous, the costa and nerves slender, subconspicuous above, distinct and raised beneath, the secondary nerves about 6–8 per side, arcuate-ascending, anastomosing, the branchlets ending in the marginal teeth, the veinlets reticulate, with more or less parallel cross-bars,

distinct beneath; petioles 1.5–2.5 cm. long, densely long-ferrugineous-strigose. Inflorescence fasciculate, axillary, or on short branches, densely ferrugineous-strigose; peduncles about 1.5 cm. long. Flowers not seen; ovary pilose. Immature fruit oblong, about 1.5 cm. long and 7 mm. across, slightly pubescent or nearly glabrate, brown, with pale lenticels; styles 2.5–3 mm. long; persistent sepals membranaceous, ovate, about 4 mm. long and 2.5 mm. broad, acute at apex, pubescent without.

Indo-China, known from Chapa, Tonkin, only, at an altitude of 1800 meters.

INDO-CHINA: Chapa, A. Pételot 3829 (A, NY, US, ISOTYPES).

Specimens of the type collection are all young fruiting ones. No additional material is available. Based on this somewhat incomplete material, this species can be compared with *A. strigosa* Hook. f. & Thoms., of India, which has smaller, narrower leaves concolored on both surfaces and never cordate at the base, and peduncles which are not strigose.

#### 6. *Actinidia henryi* Dunn in Kew Bull. 1916: 1. 1916.

Large climbing shrubs; branches slightly striated, more or less hispid, the young branchlets reddish brown-villose; pith small, lamellate, whitish. Leaves chartaceous, oblong-ovate, 8–14 cm. long, 3–6.5 cm. broad, acuminate at apex, subcordate to cordate at base, the margins minutely serrulate, dark above, pale beneath, glabrous on both surfaces except the veins, the costa and veins slender, subconspicuous above, puberulous or setose, the secondary veins about 8–10 per side, arcuately ascending, anastomosing near the margins, the veinlets reticulate, inconspicuous to subconspicuous above, conspicuous beneath; petioles relatively short, 10–25 mm. long, ferrugineous-pubescent. Inflorescences in axillary cymes, 10-flowered or more, densely reddish-villose; pedicels to 10 mm. long. Flowers white; sepals orbicular, acute at apex, about 3 mm. long, pubescent without; petals ovate, the base cuneate, rounded at apex, about 6 mm. long; stamens numerous, the filaments about 2 mm. long, the anthers yellow, sagittate-ovate; ovary subglobose, densely pubescent.

#### KEY TO VARIETIES

- A. Leaves without rigid pilose hairs..... a. var. *henryi*.  
 AA. Leaves with scattered rigid pilose hairs on the costa and veins on both surfaces..... b. var. *polyodonta*.

#### 6a. *Actinidia henryi* Dunn var. *henryi*.

*Actinidia henryi* Dunn in Kew Bull. 1916: 1(excl. spec. *Henry* 11307, 13335). 1916, in Jour. Linn. Soc. Bot. 39: 407. 1911.

Leaves chartaceous, oblong-ovate, 10.5–14 cm. long, 3–6.5 cm. broad, acuminate at apex, distinctly cordate at base, the margins very minutely mucronulate-serrulate, glabrous on both surfaces except the veins, the costa and veins reddish-puberulous below; petioles ferrugineous-pubescent when mature, about 15–25 mm. long.



Southwestern China, in southern Yunnan only, in mountain forests at altitudes of about 1650–2650 meters. Flowers white.

CHINA: Yunnan: Meng-tzu, *A. Henry 10381* (US, ISOTYPE), *10381a* (A, NY, US, ISOTYPES); Chien-shui Hsien, *H. T. Tsai 53331* (A).

Dunn's original description was based on, in addition to *Henry 10381* and *10381a* as listed above, also *Henry 11307* and *13335*, which he subsequently segregated as representing a distinct species, *A. rudis*. However, he did not then redescribe the present species. The above description was prepared by checking the differences between these specimens and his original description, and also the additional collection made by Tsai.

This species is readily distinguished from *A. rudis* by its short petioles, distinctly cordate leaves, and less copiously strigose stems. In Dunn's key, *A. henryi* is separated from *A. hemsleyana* Dunn by its leaves being glaucous beneath, while for *A. hemsleyana* the leaves are mentioned as green beneath. Actually the reverse condition is true.

6b. ***Actinidia henryi* Dunn var. *polyodonta* Hand.-Mazz. Symb. Sin. 7: 391. 1931.**

Leaves chartaceous, oblong-ovate, 8–11.5 cm. long, 2.3–4.7 cm. broad, acuminate at apex, subcordate at base, the margins minutely but distinctly serrulate, with scattered rigid setose hairs along the veins on both surfaces; petioles sparsely pilose, about 10–23 mm. long; immature fruits cylindric-oblong, sparsely pubescent.

Southwestern China, in central Yunnan and western Kwangsi, at altitudes of 1650–2450 meters.

CHINA: Kwangsi: N. Lo-ch'eng, *R. C. Ching 5897* (NY).

Handel-Mazzetti's type, from K'un-ming, north of the type locality of the typical form of the species, has not been seen. The Ching specimen cited above, from western Kwangsi, close to the Yunnan border, agrees with Handel-Mazzetti's description. Compared with the typical form of the species, this variety differs in having rigidly pilose petioles, scattered setose hairs on both surfaces of the leaves, and more distinctly serrulate leaf-margins. *Ching 5897* is a young fruiting specimen.

7. ***Actinidia strigosa* Hook. f. & Thoms. in Jour. Linn. Soc. Bot. 5: 55. 1861; Thiselton-Dyer in Hook. f. Fl. Brit. Ind. 1: 286. 1876; Dunn in Jour. Linn. Soc. Bot. 39: 407. 1911.**

Climbing shrubs; branches reddish brown, with scattered elongate pale lenticels, hispid, the young branchlets more or less densely ferrugineous-setose; pith large, whitish, lamellate. Leaves chartaceous, ovate to oblong-ovate, about 7–13 cm. long and 4–7 cm. broad, acuminate to long-acuminate at apex, obtuse to rounded at base, often obliquely so, the margins callously denticulate, the surfaces concolored, the upper surface glabrous or slightly puberulous along the costa and veins, the lower surface nearly glabrous or sparsely setose along the

costa and veins, the costa and veins inconspicuous above, distinct and raised beneath, the secondary nerves about 5–7 per side, arcuate-ascending, anastomosing, the branchlets ending in the marginal teeth, the veinlets reticulate, with many parallel cross-bars, subconspicuous beneath, petioles 2.5–3 cm. long, strigose or puberulous. Inflorescences in short 2–4-flowered axillary cymes, ferruginous-pubescent, the flowers sometimes solitary; peduncles to 1 cm. long; pedicels to 5–10 mm. long; bracts minute, linear. Flowers white; sepals 5, ovate, about 4–5 mm. long and 3–4 mm. broad, acute to obtuse at apex, glabrate or very sparsely puberulous without; petals 5, obovate, about 8 mm. long and 5 mm. broad, rounded at apex; stamens numerous, the filaments 2.3 mm. long, the anthers yellow, 1–1.5 mm. long, obtuse at apex, sagittate at base; ovary subglobose, about 1.5 mm. across, densely villous, the styles about 1.5 mm. long.

India (Sikkim), at altitudes of 2100–3300 meters. Flowers white.

INDIA: Sikkim: *J. D. Hooker s. n.* (GH, ISOTYPE); eastern Himalaya, *Griffith 57* (GH).

This species seems to be confined to Sikkim Himalaya at fairly high altitudes. It is characterized by its concolored, ovate to oblong leaves, which are sparsely setose along the costa and veins on the lower surface only.

**8. *Actinidia hemsleyana* Dunn in Jour. Linn. Soc. Bot. **38**: 355. 1908, **39**: 407. 1911.**

*Actinidia subglaucofolia* Metcalf in Lingn. Sci. Jour. **11**: 15. 1932. *Syn. nov.*

*Actinidia kengiana* Metcalf in op. cit. 16. *Syn. nov.*

High climbing shrubs to 10 m.; branches dimorphic, some long, arching, densely strigose-tawny especially when young and bearing narrow leaves, others lateral, short, strigulose to hispidulous and bearing both leaves and flowers; buds densely brownish-hispidulous; pith lamellate, brownish. Leaves chartaceous, oblong-ovate to lanceolate-oblong, mostly 8–13 cm. long, 2.5–4.5 cm. broad, some to 18 cm. long and 4 cm. broad or 20 cm. long and 10 cm. broad, acute to obtuse at apex, rounded or acute to cuneate at base, usually slightly obliquely so, the margins serrulate to appressed-serrulate, glabrous on both surfaces or brownish pubescent along the costa or veins beneath, the upper surface dark, the lower pale, usually glaucous, the costa and veins slender, subconspicuous above, distinct and raised beneath, the secondary nerves about 7 or 8 per side, arcuately ascending, anastomosing along the margins, the veinlets reticulate, inconspicuous above, inconspicuous to subconspicuous beneath; petioles 1.5–4.5 cm. long, sparsely hispid to glabrate. Inflorescences in axillary cymes of about 1–3 flowers; pedicels 1–1.5 cm. long, slender, densely brownish tomentose. Flowers greenish; staminate flowers with 5 sepals, these ovate, subacute, about 5 mm. long, densely brownish-tomentose; petals 5, glabrous, ovate, about 10 mm. long, rounded at apex; stamens numerous, about as long as the petals; rudimentary ovary 2 mm. across, tomentose.



Pistillate flowers similar but with sepals connate at base, the lobes ovate, about 8 mm. long, acute at apex, densely brownish-tomentose at apex; stamens rudimentary; ovary depressed-globose, about 6 mm. long, densely brownish-villose. Fruit (immature?) cylindric-oblong-ovoid, about 2.7 cm. long, and 1.5 cm. across, densely brown-villose to glabrate, not lenticellate, rounded at apex, crowned by the persistent short styles of about 4 mm. long.

Eastern China (Fukien and southern Chekiang), in thickets on mountain slopes at altitudes of 500-900 meters. Flowers greenish, June.

CHINA: Chekiang: Between P'ing-yang and T'ai-shun, *R. C. Ching* 2120 (A, US); Cheng-ning Hsien, *Y. L. Keng* 394 (A, TYPE of *A. kengiana* Metcalf). Fukien: Nan-p'ing Hsien (Yenping), *Hongk. Herb.* 2400 (A, ISOTYPE); Shouning Hsien, *Y. L. Keng* 339 (A, TYPE of *A. subglaucifolia* Metcalf).

This distinct species has a known range limited to northern Fukien and southern Chekiang. Two specimens of Dunn's type collection, *Hongkong Herb.* 2400, have been seen. Although Dunn's key specifically indicates that the leaves of this species are green beneath instead of glaucous, actually these two specimens have distinctly glaucous leaves. The other collections here cited show that the leaves vary from glaucous to subglaucous, but they are never concolored.

Type specimens of both species of Metcalf, in the Arnold Arboretum herbarium, have been seen. They are leafy specimens with a few detached young fruits, and I cannot separate them from *A. hemsleyana*. *Actinidia subglaucifolia* Metcalf is based on a specimen with nearly glabrous stems and leaves. Metcalf describes the plants as glabrous and the leaves as glabrous above and somewhat glaucous beneath. He has apparently overlooked the dense brown hairs on the buds and the sparse strigose blackish hairs on the young stems and petioles. In this specimen the leaves are glabrous throughout. *Actinidia kengiana* Metcalf is represented by a stout twig with a few leaves. Among these leaves some are of the size described by Dunn, but a few are exceptionally large. The young shoots are distinctly and densely strigose. The leaves are, as described by Metcalf, "glabrous above, glaucous and sparsely rusty-hairy beneath, especially along the veins." Metcalf compared his *A. subglaucifolia* with *A. sabiaefolia* Dunn, and his *A. kengiana* with *A. melliana* Hand.-Mazz., but he failed to mention *A. hemsleyana* Dunn.

Dunn, who collected this plant in the field calls special attention to the dimorphism in the stems, and flowers, in this and in many other members of the genus as well. He says that the habit of this plant seems to illustrate the usual method of growth in many species of *Actinidia* and explains some of the apparent anomalous specimens in the herbarium. He remarks: "Each new extension of the shrub begins in this case with a long arching, densely strigose tawny shoot bearing abnormal narrow leaves. In the autumn these leaves fall, leaving large thickened leaf-scars and a bud above each, protected by a tuft of stiff yellow hairs. These buds develop in the spring into short flower- and leaf-

bearing shoots, the leaves and the indumentum being quite different to those primary shoots."

9. **Actinidia arisanensis** Hayata, Icon. Pl. Formos. 8: 11. 1911; Sasaki in Trans. Nat. Hist. Soc. Formosa. 19: 480. 1929; Kanehira, Formos. Trees, rev. ed. 448, f. 405. 1936.

*Actinidia rankanensis* Hayata, op. cit. 13.

*Actinidia remoganensis* Hayata, op. cit. 13.

Tall climbing shrubs to 5 m. or more; branches dimorphic, the spring shoots glabrous to densely strigose, with narrower glabrous or sparsely setose or more or less densely strigose leaves, the summer shoots flowering, strigose to glabrous, with generally broader nearly glabrous leaves; pith very small, brown, lamellate. Leaves chartaceous, ovate-oblong to ovate, 8–15 cm. long, 3–9 cm. broad, acute to acuminate at apex, cuneate to rounded to subcordate at base, usually unequal, the margins sparsely and finely denticulate, glabrous or strigose on both surfaces or sparsely setose above and tomentose along the costa and sometimes also along the veins beneath, concolored or slightly paler beneath, the costa and veins inconspicuous to subconspicuous above, distinct and raised beneath, the secondary veins 5–7 per side, straight-ascending, the veins or their branches ending in the marginal teeth, the veinlets reticulate, distinct and raised beneath; petioles usually long, slender, 1.5–4.5 cm. long, densely or sparsely strigose or glabrous. Inflorescences in axillary cymes, 3- or 4-flowered, the pedicels nearly glabrous, 5–10 mm. long; bracts minute. Flowers white; sepals 5, oblong, rounded at apex, about 4 mm. long and 2 mm. broad, glabrous without, the margins pubescent; petals 5, oblong-ovate to oblong-lanceolate, about 7 mm. long and 3 mm. broad, rounded at apex, cuneate and contracted at base; stamens numerous, the filaments filiform, the anthers yellow, oblong, about 1.3 mm. long, obtuse at apex, sagittate at base; ovary subglobose, densely tomentose; styles about 4 mm. long. Fruit subglobose, about 2.3–3.5 cm. across, glabrate, lenticellate.

China, in Taiwan only, in thickets and forests at altitudes of 1160–2260 meters. Flowers white, April–May.

CHINA: Taiwan: Suao, *E. H. Wilson* 11122 (A, US); Taihai, near Giran, *E. H. Wilson* 10255 (A); Arisan, *E. H. Wilson* 9671 (A), 10897 (A); Funkiko, Arisan, *E. H. Wilson* 9658 (A); Keitou, Arisan, *E. H. Wilson* 10862 (A, US); Arisan to Mt. Morrison, *E. H. Wilson* 10943 (A, US).

This is a very variable plant, with dimorphic spring vegetative and summer flowering shoots. The young sterile shoots may be strigose bearing densely strigose leaves as in *Wilson* 9658, or with nearly glabrous stems and leaves sparsely strigose above only as in *Wilson* 10225, or with nearly glabrous leaves as in *Wilson* 11122. The flowering shoots bear larger broader leaves, generally strigose all over the upper surface.

In those specimens of nearly glabrous habit, it is difficult to dis-



tinguish this species from *A. callosa* var. *formosana* superficially. However, upon closer examination, strigose hairs can generally be revealed from either young or old stems in *A. arisanensis*. The leaves of *A. arisanensis* are also larger and relatively narrower, and they never become obovate as in *A. callosa* var. *formosana*. The fruit of *A. arisanensis* is also much larger. This species inhabits only the northern central mountainous parts of the island, at high altitudes, while *A. callosa* var. *formosana* is of the lower altitudes and is more widespread.

The variable nature of the species can be shown by the fact that Hayata described at the same time three species which now cannot be maintained. He distinguishes his *A. arisanensis* from his *A. rankanensis* "by the leaves which are nearly obtuse or slightly cuneate at the base." *Actinidia remoganensis* Hayata is: "Near *A. rankanensis*, but distinguishable from it in the less serrulate or nearly entire leaves and in the narrower petals." Photographs of type specimens of all three are available. These and the original descriptions prove that Sasaki is justified in reducing the two additional names.

The relationship of *A. arisanensis* is clearly with *A. hemsleyana* Dunn of the nearby coastal provinces Chekiang and Fukien.

10. ***Actinidia kolomikta*** (Maxim. & Rupr.) Maxim. in Mém. Acad. Sci. St. Pétersb. Sav. Etrang. 9: 63. 1859 (Prim. Fl. Amur.).

Climbing shrubs to 7 m.; branches usually dark, glabrous or the very young branchlets slightly pubescent; pith brown, lamellate. Leaves membranaceous, sometimes partly discolored or variegated, with a large white to pink blotch at the apex often extending to the middle or beyond, especially in the staminate plant, ovate to oblong-ovate, 6–15 cm. long, 3–12.5 cm. broad, acuminate at apex, distinctly cordate at base, more rarely subcordate to truncate, sometimes unequal, the margins serrulate, concolored or slightly paler beneath, glabrous on both surfaces to sparsely setose or pubescent along the costa and veins, the costa and veins slender, inconspicuous above, distinct and raised beneath, the secondary veins about 6–8 per side, slightly arcuately ascending, anastomosing, the veinlets reticulate, inconspicuous on both surfaces to subconspicuous beneath; petioles slender, 2.5–3.5 cm. long, glabrous to sparsely pubescent. Flowers 1–3-fascicled; pedicels slender, 6–10 mm. long, glabrous to rusty-tomentose; bracts minute, linear; sepals, 5, ovate, 5–6 mm. long, 3–4 mm. wide, glabrous, acute at apex, more or less connate at base; petals 5, oblong, about 10 mm. long and 5 mm. broad, rounded at apex, gradually narrowed at base; stamens numerous, the filaments slender, 5–6 mm. long, the anthers yellow, slightly sagittate; ovary cylindric-ovoid, about 3 mm. long and 2 mm. across, glabrous; styles 3–5 mm. long. Fruit globose, about 2 cm. in diameter, glabrous, not lenticellate.

*Actinidia kolomikta* is here considered as composed of two varieties, a typical form in eastern Siberia, Manchuria, Korea, and Japan, and another variety in western China.

## KEY TO THE VARIETIES

- A. Leaves generally smaller, slightly narrower, to  $10 \times 8$  cm., rarely larger, with or mostly without scattered setose hairs; peduncles and pedicels usually glabrate. . . . . a. var. *kolomikta*.  
 AA. Leaves generally larger and broader, to  $15 \times 12.5$  cm., often with scattered setose hairs; peduncles and pedicels usually rusty tomentose. . . . . b. var. *gagnepainii*.

10a. **Actinidia kolomikta** (Maxim. & Rupr.) Maxim. var. **kolomikta**.

*Actinidia kolomikta* (Maxim. & Rupr.) Maxim. in Mém. Acad. Sci. St. Pétersb. Sav. Etrang **9**: 63. 1859 (Prim. Fl. Amur.); Dunn in Jour. Linn. Soc. Bot. **39**: 404. 1911.

*Prunus?* *kolomikta* Maxim. & Rupr. in Bull. Phys. Math. Acad. Sci. St. Pétersb. **15**: 129. 1856.

*Kolomikta mandshurica* Regel in Bull. Phys. Math. Acad. Sci. St. Pétersb. **15**: 219. 1857.

*Trochostigma kolomikta* Rupr. in Bull. Phys. Math. Acad. Sci. St. Pétersb. **15**: 262. 1857.

Leaves ovate to oblong-ovate, sometimes discolored or variegated, about 6–11 cm. long and 3–8 cm. broad, glabrous on both surfaces to sparsely or slightly setose above and sparingly pubescent along the costa and veins beneath; peduncles and pedicels glabrous to sparsely pubescent.

Eastern Siberia, Sakhalin, Manchuria, Korea, and Japan, in thickets at altitudes of 150–1600 meters. Flowers white, June–July.

EASTERN SIBERIA: Amur, *Maximowicz s. n.* (GH, NY, US), *S. E. Enander s. n.* (A), *Korzinsky s. n.* (A, GH, US), *V. Komarov 1088* (US); Vladivostok, *N. Palczewsky s. n.* (A, NY), *D. L. Topping 2168* (A), *Goldensstaedt s. n.* (GH), *C. S. Sargent s. n.* (A).

SAKHALIN: Sakhalin, *F. Schmidt s. n.* (GH), *G. Faurie 469* (A); Ohdomari, *K. Uno 19923* (A, US), *E. H. Wilson s. n.* (A).

MANCHURIA: Ad fl. Amur, *R. Maack s. n.* (GH); Er-tao-tien-tzu, *P. H. & D. H. Dorsett 3068* (US); Kao-ling-tzu, *P. H. & D. H. Dorsett 5985* (A, N, US), *V. Skvortzov s. n.* (A); Mifun Station, *V. Skvortzov s. n.* (A); Mao-erh-shan Station, *V. Skvortzov s. n.* (A); Hsing-an, *V. Komarov 1088* (A, NY); Kirin, O-mu Hsien, *H. W. Kung 1897* (NY); coast of Manchuria, *C. Wilford s. n.* (GH)

KOREA: Taiyudo, prov. N. Heian, *E. H. Wilson 8604* (A, US); Kongo-san, prov. Kogen, *E. H. Wilson 10485* (A, US).

JAPAN: Hokkaido: Shibetsu, *K. Miyabe s. n.* (A); Hyukogen, *K. Uno 16305* (A); Iburu, *S. Hashimoto s. n.* (A); Konoma, *Maximowicz s. n.* (GH); Mt. Moiwa, *E. Tokukuchi s. n.* (GH); Kushiro, *E. H. Wilson s. n.* (A); Morinan jama *E. H. Wilson s. n.* (A); Meakan, *T. Tanaka 222* (A, US). Hondo: Sinano, *K. Shiota 3320* (A); Mino, *K. Shiota 4904* (A), *9698* (A), *M. Kentaro 3322* (A); Fujiyama, *P. H. Dorsett & W. J. Morse 374* (A, US); Huzisan, *T. Sawada 2230* (A); Juzogatake, *G. Faurie 5390* (A); Rikuchu, *E. H. Wilson s. n.* (A); Lake Chuzenji, *E. H. Wilson s. n.* (A), *J. G. Jack s. n.* (A); Miyachine, *G. Faurie 6912* (A).



10b. *Actinidia kolomikta* (Rupr. & Maxim.) Maxim. var. *gagnepainii* (Nakai), comb. nov.

*Actinidia gagnepainii* Nakai in Bot. Mag. Tokyo **47**: 258. 1933.

*Actinidia kolomikta* sensu Hemsl. in Jour. Linn. Soc. Bot. **23**: 79. 1886, p.p.; Dunn in Jour. Linn. Soc. Bot. **39**: 404. 1911, p.p.; Rehder in Sarg. Pl. Wils. **2**: 380. 1916; non Maxim.

Leaves ovate to ovate-oblong, sometimes discolored or variegated, about 6–15 cm. long and 5–12.5 cm. broad, usually with scattered setose hairs along the veins on both surfaces, sometimes glabrous; peduncles and pedicels more or less rusty-tomentose.

Western China (Shensi, Hupeh, Szechuan, and Sikang), in thickets at altitudes of 1800–3600 meters. Flowers white, May–June.

CHINA: Hupeh: Western Hupeh, *A. Henry s. n.* (NY), 5622 (NY), 6922A (NY), 8806 (GH). Szechuan: Kuan Hsien, *E. H. Wilson* 2008 (A, US), 2009 (A, GH, US), *W. P. Fang* 2239 (A), *F. T. Wang* 20591 (A); Wen-ch'üan Hsien, *E. H. Wilson* 1058 (A), 1058A (A, US), *F. T. Wang* 21097 (A); O-mei-shan, *E. H. Wilson* 4761 (A, US), *W. P. Fang* 2801 (A, NY), 2865 (A), *F. T. Wang* 23356 (A), *W. W. Ma* 2579 (A), *S. C. Sun & K. Chang* 930 (A), 1141 (A), 1358 (A), *H. C. Chow* 8235 (A), 12379 (A), Wa-wu-shan, *E. H. Wilson* 854a (A, GH, US); Nan-ch'üan Hsien, *W. P. Fang* 910 (A, NY); O-pien Hsien, *T. T. Yü* 856 (A); Ma-pien Hsien, *F. T. Wang* 23010 (A), 23093 (A); between Hai-tang and P'ing-yu-p'u, *H. Smith* 1986 (A); P'ing-shan Hsien, *F. T. Wang* 22704 (A); "Tsing-chuan-fin Hsien," *F. T. Wang* 22350 (A). Sikang: No precise locality, *E. A. Pratt* 101 p.p. (GH); K'ang-ting Hsien (Tachienlu), *E. H. Wilson* 2005 (A, GH); Yueh-sui Hsien, *T. T. Yü* 943 (A).

Nakai separates the western Chinese plant as a distinct species, *A. gagnepainii*, basing it on *Henry* 8806, 8994, *Wilson* 4761, *Pratt* 830, and *David s. n.* According to him, the western Chinese plant differs from *A. kolomikta* as follows: "The Chinese *Actinidia* has more vigorous shoots, broader leaves with more brownish and thicker hairs on the veins, and more rigid hairs on the surface. The leaves never become white or crimson like *A. kolomikta*. Its flowers are similar to those of *A. kolomikta* but the pedicels are more robust."

These characters, as can be easily seen, are all relative and necessarily inconstant. There are no fundamental structural differences between the plant from northeastern Asia and that of western China. Rehder, following Dunn, gives *A. platyphylla* A. Gray ex Miq. as a synonym of *A. kolomikta* and remarks: "The plant from western China does not show any obvious difference from the Japanese plant except that the leaves are generally larger and broader."

Leaving out for the time being the problem of typification and identity of *A. platyphylla*, which will be discussed in connection with *A. arguta*, it is sufficient to say that the western Chinese plant, for which a much larger series of specimens than at Nakai's disposal is now at hand, does not show fundamental differences which warrant specific separation from the typical form of *A. kolomikta*. Instead,

one is impressed by the close similarity and resemblance in all respects between the plants from the two areas. Recognizing two separate and distinct species on the basis of such slender grounds would obscure entirely their close genetic kinship. Nakai mentions that the leaves of the western Chinese plant "never become white or crimson like *A. kolomikta*." This is an erroneous statement, as in the large series of specimens now available, many specimens, such as *Wilson 854a*, 2005, and 2008, have equally white or crimson blotched leaves. This further attests the close relationship between these plants. It seems that the plant from western China deserves only to be recognized as a variety, as it has a distinct geographical range. This differentiation is also in line with another widespread species of the genus, *A. polygama*, where the western Chinese form is only slightly different from the plant in northeastern Asia.

11. ***Actinidia polygama*** (Sieb. & Zucc.) Maxim. in Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 9: 64. 1859 (Prim. Fl. Amur.).

Climbing shrubs, to 5 m., the stem slender; branches glabrous or the very young shoots sometimes lightly puberulous; pith large, white, solid. Leaves membranaceous, sometimes the whole leaf white or yellowish or the upper half variegated with a blotch of white or pale yellow, ovate, 7–12.5 cm. long, 4.5–8.5 cm. wide, the apex long-acuminate, the base acute to rounded to truncate, very rarely subcordatulate, the margins finely serrulate, dark green and glabrous or rarely sparsely setose above, slightly paler beneath and setose along the costa and the main veins or glabrous, the costa and veins slender, inconspicuous above, distinct and elevated beneath, the secondary veins 6 or 7 per side, arcuate-ascending, strongly anastomosing, the veinlets reticulate, inconspicuous above, subconspicuous beneath; petioles slender, 2–4.5 cm. long, glabrous or sparsely setose. Flowers white, solitary or 2- or 3-fascicled, lateral, the pedicels slender, 6–10 mm. long, more or less puberulous; sepals 5, ovate, sometimes unequal, about 7 mm. long and 4.5 mm. wide, acute at apex, more or less glabrous, the margins finely ciliate, the base somewhat cuneate; petals 5, oblong-ovate, 12–13 mm. long, 5.5–10 mm. wide, the apex rounded to obtuse, the base broad; stamens numerous, the filaments slender, filiform, 5–6 mm. long, the anthers yellow or brown, 1.5–2 mm. long, the apex pointed, the base sagittate; rudimentary ovary in staminate flowers very small, globose; ovary bottle-shaped, 3.5–4.5 mm. long, about 2 mm. in diameter, glabrous, the styles about 3 mm. long. Fruit globose to ovoid, about 2.5 cm. across, yellow, glabrous, not lenticellate, the apex rostrate.

Nakai separates some of the plants formerly referred to *A. polygama* from Szechuan and Hupeh as a distinct species, *A. lecomtei*. The latter has also the distinct solid white pith and "white or brownish crisped hairs on the principal veins like *Actinidia polygama*, but lacks of rigid glands. Its anthers are not yellow, but are purplish or purple." The



specimens quoted by him are *Farges 406*, type, *Farges 79 p. p.*, *Henry s.n.*, 1788, 6644 *p. p.*, *David s. n.*

Nakai at the same time considers *A. polygama*, of Manchuria, Korea, and Japan, as also present in western China, citing *Wilson 1363* and *1363a* from Hupeh. These collections are also available for the present study. Number *1363* agrees in all respects with the other collections from western China, especially in the nearly glabrous leaves and the brown anthers. Number *1363a*, apparently from a younger shoot, has leaves that are very sparsely setose on both surfaces, evidently the so-called rigid glands of Nakai. The anthers are also brownish.

With a very large series of specimens from China proper, Manchuria, Korea, and Japan, I am convinced that the widespread species *A. polygama*, as currently accepted, can at most be differentiated into two geographical varieties, one in the east, in Japan, Korea, and Manchuria, and one in the west, in western China, but not as two species coexisting in western China. The typical form in the east has yellow anthers and leaves with scattered setose hairs on the veins on both surfaces. Extending from Korea inland to Manchuria, the plants become more and more glabrate. The plant of western China, here considered as representing a separate variety, has nearly glabrous leaves only occasionally setose on one or both surfaces or slightly hairy along the veins on the lower surface only. The anthers are brownish in color, generally of a darker shade than the typical form in the dried state. In all other characters, the two varieties seem exactly identical.

*Actinidia polygama* has been much confused in literature and herbaria with *A. kolomikta*, but, as Rehder has noted, it is readily distinguished by the large solid white pith of its branches. In *A. kolomikta*, as well as most other related species, the pith is lamellate and mostly brownish in color. *Actinidia kolomikta* has also distinctly cordate leaves, while in *A. polygama* the leaf-bases are rounded to subacute but never cordate. Also in *A. kolomikta* the ovary is cylindric-ovoid and not bottle-shaped as in *A. polygama* and other allied species.

#### KEY TO THE VARIETIES

- A. Leaves more or less sparsely setose along the veins beneath; anthers yellow (Manchuria, Korea, Japan).....11a. var. *polygama*.
- AA. Leaves generally glabrous, rarely sparsely setose beneath; anthers brown (western China).....11b. var. *lecomtei*.

#### 11a. *Actinidia polygama* (Sieb. & Zucc.) Maxim. var. *polygama*.

*Actinidia polygama* (Sieb. & Zucc.) Maxim. in Mém. Acad. Sci. St. Pétersb. Sav. Étrang. **9**: 64 1859 (Prim. Fl. Amur.); Miq. in Ann. Mus. Bot. Lugd.-Bat. **3**: 15. 1867 (Prol. Fl. Jap. 203); Dunn in Jour. Linn. Soc. Bot. **39**: 403. 1911; Nakai in Bot. Mag. Tokyo **47**: 254. 1913, *p. p.*

*Trochostigma polygama* Sieb. & Zucc. in Abh. Phys.-Math. Cl. Akad. Wiss. Münch. **3**: 727, *t. 2, f. 2*. 1843.

*Trochostigma volubilis* Sieb. & Zucc. in loc. cit.

*Actinidia volubilis* (Sieb. & Zucc.) Planch. ex Miq. in Ann. Mus. Bot. Lugd.-Bat. **3**: 15. 1867 (Prol. Fl. Jap. 203).

Leaves glabrous or sometimes sparsely setose above, more or less sparsely setose along the veins on the lower surface; anthers yellow.

Sakhalin, Manchuria, Korea, Japan. Flowers white.

JAPAN: Hokkaido: Without precise localities, *Maximowicz s. n.* (GH, NY), *E. H. Wilson 7312* (US); Muroran, *C. S. Sargent s. n.* (A); Sapporo, *J. G. Jack s. n.* (A, GH), *Sapporo Agr. Coll. s. n.* (A); *K. Miyabe s. n.* (A). Tokubuchi *s. n.* (GH), *E. H. Wilson s. n.* (A). Hon-do: Nikko, *J. G. Jack s. n.* (A, GH), *E. H. Wilson s. n.* (A); Mino prov., *Shiota 3317* (A), *8038* (A); Hyogoken, *K. Uno 19136* (A); Takao-san, Musashi prov., *E. H. Wilson s. n.* (A), *P. H. Dorsett & W. J. Morse 794* (US); Mt. Mitsumune, Musashi prov., *No. coll.* (US); Mt. Tanigawa, Niigata, *S. Suzuki 398026* (A); Nanokawa, Tosa, *No. coll.* (GH, US); Yoshino, Yamato, *Tokyo Mus. 75* (US); Asama, *G. Faurie 6127* (A). Kiusiu: Fukuoka, *T. Tanaka 206* (A). Tsushima, *C. Wilford s. n.* (GH).

KOREA: Keijyo, prov. Keiki, *E. H. Wilson 8752* (A, US), *10608* (A, US); Oo-ryong-too, *E. H. Wilson 8501* (A); Tanyudo, prov. Heian, *E. H. Wilson 8675* (A); Konga-san, prov. Kogan, *E. H. Wilson 10533* (A, US); Quelpaert, *T. Taquet 989* (A), *2681* (A), *2682* (A), *2684* (A), *2689* (A).

CHINA: Manchuria: Bay possiet, *Maximowicz s. n.* (GH, NY, US); Port Deans, Dundas, *Maximowicz s. n.* (GH); Mao-erh-shan Station, *B. V. Skvortzov s. n.* (A); Mifun Station, *B. V. Skvortzov s. n.* (A), *P. H. Dorsett 41757* (A, GH, NY, US).

Two species of *Trochostigma* described by Siebold & Zuccarini from Japan, *T. polygama*, and *T. volubilis*, have long been recognized as representing the same species of *Actinidia*, the earlier name being *A. polygama* adopted by Maximowicz (1859) and also by Miquel (1867). Also see Nakai for his listing for various misapplied names based on Japanese plants of this species.

*Trochostigma repanda* Sieb. & Zucc. was included in the synonymy of *A. polygama* by Maximowicz (in Bull. Acad. Sci. St. Pétersb. **31**: 19. 1887) together with *T. polygama* and *T. volubilis*. This was followed by most subsequent authors and a combination in *Actinidia* was effected by Honda as *Actinidia repanda* (Sieb. & Zucc.) Honda ex Koidz. in Acta Phytotax. Geob. **9**: 97, in clavi, 1940. However, the type of this species, as indicated by A. C. Smith, represents a species of *Schisandra*, actually the same as the well-known *S. nigra* Maxim. of Japan and Korea, which is now properly known as *Schisandra repanda* (Sieb. & Zucc.) A. C. Smith. See Sargentia **7**: 143-146. 1947, for a full discussion.

11b. *Actinidia polygama* (Sieb. & Zucc.) Maxim. var. *lecomtei* (Nakai) comb. nov.

*Actinidia lecomtei* Nakai in Bot. Mag. Tokyo **47**: 253. 1933.

*Actinidia melanandra* sensu Finet & Gagnep. in Bull. Soc. Bot. France **52**: Mém. **4**: 21. 1905, p. p. (Contr. Fl. As. Or.); Dunn in Jour. Linn. Soc. Bot. **39**: 403. 1911, p. p.; non Franch.



*Actinidia polygama* sensu Finet & Gagnep. l.c., p.p.; Rehder in Sarg. Pl. Wils. **2**: 380. 1915; Nakai in Bot. Mag. Tokyo **47**: 254. 1933, p. p.; Chun in Sunyatsenia **1**: 273. 1934; non Maxim.

Leaves glabrous or rarely sparsely setose above, generally glabrous on the lower surface, rarely very sparsely setose; anthers dark brown.

Western China (western Hupeh, Szechuan, and southern Shensi), in thickets at altitudes of 1350–2100 meters. Flowers white, June–July.

CHINA: Shensi: T'ai-pei-shan, *W. Purdom* 891 (A, US), *G. Fenzl* 878 (A). Hupeh: Without precise localities, *E. H. Wilson* 5922 (GH), 5922A (GH), 5922B (GH), 7637 (GH); Fang Hsien, *E. H. Wilson* 2013 p. p. (A); Hsing-shan Hsien, *E. H. Wilson* 2013 p. p. (A, GH, US); Wu-tu-ho, *W. Y. Chun* 3641 (A); "Gia-che-yuan," *W. Y. Chun* 4205 (A, US). Szechuan: Wa-shan, *E. H. Wilson* 934A p. p. (A, GH, US), 2010 (A, GH, US); Pao-hsing Hsien (Muping), *E. H. Wilson* 934A p. p. (A, US) *K. L. Chu* 3760 (A), 3870 (A); South Wushan, *A. Henry* 5764 (A, GH), 5922 (US), 5922A (A), *E. H. Wilson* 1363 (A, NY, US), 1363A (A, NY, US); Ch'eng-k'ou Hsien, *R. P. Farges* 406 (NY).

The citation of Chun in literature refers to the collection *S. P. Ko* 53081, from Kwangtung. I have not been able to consult this collection and therefore am not sure as to the propriety of referring it to this variety, as it is geographically distinct from the known range.

Some of the herbarium specimens from eastern China alleged to be *A. polygama* are found to represent an entirely different and little-known species, *A. valvata* Dunn.

## 12. *Actinidia valvata* Dunn in Jour. Linn. Soc. Bot. **39**: 404. 1911.

Climbing shrubs to 13 m., the young branches glabrous to sometimes grayish pubescent, pale; pith small, white, solid or slightly lamellate. Leaves chartaceous, ovate to ovate-lanceolate, 6–10 cm. long, 3–5 cm. broad, acute to long-acuminate at apex, cordate to acute or rarely truncate at base, sometimes unequally so, the margins minutely serrulate, concolored or slightly paler beneath, glabrous on both surfaces or sometimes slightly pubescent in the nerve-axils beneath, the costa and veins inconspicuous to subconspicuous above, distinct and raised beneath, the secondary veins 5 or 6 per side, arcuate-ascending, anastomosing, inconspicuous above, conspicuous or subconspicuous beneath; petioles slender, 1–2 cm. long, glabrous. Flowers 1–3-fascicled, axillary; pedicels very slender, 1–1.3 cm. long, sparsely puberulous; bracts linear, minute; sepals 2 or 3, concave, strictly valvate, more or less unequal, ovate, 7–9 mm. long, 4–6 mm. wide, acute at apex, glabrous or slightly puberulous without; petals 7 or 8, white, imbricate, oblong, 1–1.2 cm. long, about 6 mm. wide, acute to rounded at apex, attenuate at base; stamens many, the filaments slender, about 5 mm. long, the anthers yellow; ovary bottle-shaped, glabrous. Fruit globose or ovoid, about 2–2.5 cm. across, yellow or orange, glabrous, not lenticellate, with persistent calyx at base.

Eastern China (northern Kiangsi, southern Anhwei, southern Ki-

angsu, and Chekiang), in thickets at altitudes of 200–800 meters. Flowers white, May.

CHINA: Kiangsi: Yung-hsing Hsien, *H. H. Hu* 804 (A). Anhwei: Huang-shan, *R. C. Ching* 3054 (A, US); Ch'ung-yün, *A. N. Steward* 7226 (A, US). Kiangsu: I-shing Hsien, *Ching & Tso* 551 (A), *Y. L. Keng* 2589 (A); Nanking, *W. Y. Chun* 2117 (A), 2139 (A). Chekiang: Ch'ang-hua Hsien, *F. N. Meyer* 1532 (A, NY), *Y. L. Keng* 590 (A); Tien-mu-shan, *H. H. Hu* 1659 (A), *T. Tang & W. Y. Hsia* 117 (A); T'ien-tai-shan, *C. Y. Chiao* 14392 (A, US).

Dunn's type is from Lu-shan, Kiangsi, *Bullock* 121, which has not been seen by me. The description is clear and the species distinct, but since its publication it has not been recorded by any other author. Actually it appears to be a common plant of the coastal provinces of eastern China. Specimens in the herbaria are mostly erroneously identified as *A. polygama*, a species apparently not present in these provinces. The species has indeed the general appearance of *A. polygama*, and the two are genetically close, as evidenced by the presence of the very distinct, solid white pith in the branches of both. The pith, however, is much smaller in *A. valvata* and sometimes it is slightly lamellate. *Actinidia valvata*, moreover, is readily distinguished from *A. polygama*, and for that matter also from all other species of the genus, in the unique form of the calyx, which is irregularly split into 2 or 3 concave sepals.

13. **Actinidia tetramera** Maxim. in *Acta Hort. Petrop.* **11**: 35. 1890; Dunn in *Jour. Linn. Soc. Bot.* **39**: 404. 1911; Rehder in *Sarg. Pl. Wils.* **2**: 381. 1915.

*Clematoclethra giraldi* Diels in *Bot. Jahrb.* **29**: 472. 1900.

*Actinidia rubricaulis* sensu Dunn in *Jour. Linn. Soc. Bot.* **39**: 407. 1911, p. p., (*quoad Wilson* 4764, 3271), non Dunn in *Kew Bull.* **1906**: 2. 1906.

High climbing shrubs to 13 m., the branches grayish to reddish brown, glabrous, the very young branchlets sometimes puberulous; pith small, lamellate, brown. Leaves chartaceous, sometimes variegated with blotches of white or pink, narrowly oblong-ovate, about 5–10 cm. long and 2.5–4 cm. broad, long-acuminate at apex, obliquely cuneate to truncate or rarely subcordate at base, serrulate at margins, glabrous on both surfaces to slightly setose on the costa beneath, with tufts of white hairs in the axils of secondary veins beneath, the two surfaces concolored, the costa and veins inconspicuous to subconspicuous above, raised and subconspicuous beneath, the secondary veins very slender, 6–8 per side, arcuately ascending, anastomosing, the veinlets reticulate, subconspicuous to inconspicuous beneath; petioles 1.5–3 cm. long, glabrous or nearly so. Inflorescences glabrous or nearly so, the flowers 2- or 3-fascicled or solitary; pedicels slender, 1–2 cm. long; bracts minute, linear; sepals 4, very rarely 5, ovate, 4–5 mm. long, 2–3 mm. broad, acute to rounded at apex, the margins ciliate; petals 4, rarely 5, oblong, about 7 mm. long and 5 mm. broad, rounded at apex; stamens



numerous, the filaments very slender, about 4 mm. long, the anthers yellow, oblong, about 2 mm. long, rounded at both ends, broader but not sagittate at base; ovary cylindric to slightly bottle-shaped, glabrous, the styles about 3 mm. long. Fruit ovoid, about 1.5–2 cm. long, 0.7–1.5 cm. across, brown, glabrous, not lenticellate.

Western China (Kansu, Shensi, western Hupeh, Szechuan, and Sikang), in thickets at altitudes of 1300–2700 meters. Flowers white, sometimes tinged with pink, June.

CHINA: Kansu: T'ien-shiu Hsien, *F. Fenzl s. n.* (A); Lower Tebbu Country, *J. F. Rock 14728* (A), *15026* (A). Shensi: T'ai-peishan, *W. Purdom 892* (A, US); "Kan-y-san," *J. Giraldis s. n.* (A). Hupeh: Without precise locality, *E. H. Wilson 6821* (GH); Fang Hsien, *E. H. Wilson 2011* (A, US), *4322 p. p.* (A, US); Hsing-shan Hsien, *E. H. Wilson 2096* (A, US). Sikang: K'ang-ting Hsien, *C. Y. Chiao 1635* (A). Szechuan: Sung-p'an Hsien, *E. H. Wilson 4557* (A), Pao-hsing Hsien (Muping), *E. H. Wilson 809a* (A); Kuan Hsien, *E. H. Wilson 2006* (A), *4322 p. p.* (A); Ch'eng-k'ou Hsien, *R. P. Farges 530* (NY, ISOTYPE); O-mei-shan, *E. H. Wilson 4764* (A), *W. P. Fang 3063* (A), *6559* (A), *16625* (A), *C. L. Sun 2166* (A), *S. C. Sun & K. Chang 292* (A).

This species is related to *A. kolomikta* but can be readily distinguished by its smaller narrower oblong-ovate leaves, bearded in the axils of the secondary veins beneath but otherwise glabrous or rarely setose on the costa, and also by the tetramerous flowers. Both species have similar brown lamellate piths. The leaves of *A. tetramera*, like those of *A. kolomikta*, are frequently variegated. The flowers, especially the pistillate ones, are occasionally 5-merous.

*Clematoclethra giraldii* Diels is given in the synonymy by Rehder. A photograph of the holotype is in the herbarium of the Arnold Arboretum.

Plants from O-mei-shan, Szechuan province, at the southernmost limit of the species, have slightly smaller flowers, of generally darker reddish color, and shorter peduncles, and they may prove to represent a variety of the species when more material is made available.

#### 14. *Actinidia maloides* sp. nov.

Frutex scandens, 5–6 m. altus, ramis teretibus longitudinaliter sulcatis, purpureo-nigrescentibus vel cinnamomeis, glabris, ramulis novellis leviter puberulis; medulla parva brunnea lamellata; foliis chartaceis, interdum variegatis, oblongo-ovatis, circiter 5.5–8.5 cm. longis et 3–3.5 cm. latis, apice acuminatis, basi latis, plus minusve cordatis interdum rotundatis, valde inaequalibus, margine minute serrulatis, utrinque concoloribus glabris vel supra sparse setosis subtus parvissecus venas pubescentibus, costa supra subprominente subtus prominente, nervis lateralibus utrinsecus 6–8, supra paulo impressis subtus elevatis prominentibus, arcuato-adscendentibus, prope marginem anastomosantibus, venis reticulatis subtus subprominentibus; petiolis 1.5–2.5 cm. longis, glabris vel puberulis; inflorescentiis axil-

laribus puberulis, 2-4-, plerumque 3-floris, pedunculis gracilibus, ad 1.5 cm. longis, pedicellis ad 1 cm. longis, bracteis nullis; sepalis 5, ovatis, purpureo-rubrescentibus, glabris vel glabratis, circiter 5 mm. longis et 3 mm. latis, acutis, margine minute ciliatis; petalis 5, obovatis, circiter 8 mm. longis et 7 mm. latis, rotundatis, pallide roseis, ad apicem rubescentibus; staminibus numerosis, filamentis gracilibus, circiter 3-4 mm. longis, antheris flavis oblongis circiter 2.5 mm. longis, rotundatis, basi sagittatis; ovario rudimentario minute globoso, glabro, stylis numerosis; fructibus brunneis oblongis ad 2 cm. longis et 1.2 cm. diametro, glabris, elenticellatis; seminibus ovoideis compressis, circiter 2 mm. longis et 1.5 mm. crassis, testa in sicco minute reticulata.

Western China (Sikang), on mountain slopes among thickets at an altitude of about 2000 meters. Flowers pink, May-June.

CHINA: Sikang: Yueh-sui Hsien, *T. T. Yü 927* (A, TYPE); Han-yüan Hsien, *E. H. Wilson 854* (A, fruit).

This species is of the alliance of *A. kolomikta*. It has similarly variegated leaves characteristic of some of the species of this general group. It is apparently most closely related to *A. tetramera* Maxim., but can be distinguished by the consistently 5-merous, pink flowers, with purplish red calyx and sagittate anthers, and the broad leaves which usually have broad, cordate bases.

The pink petals are red toward the upper margins, like the flowering crab apple. In flower this clearly is the most showy species of the genus.

### 15. *Actinidia kwangsiensis* sp. nov.

Frutex scandens, circiter 3 m. altus, ramulis oppositis, atrobrunneis, lenticellis parvis pallide dispersis, glabris, ramulis novellis plus minusve ferrugineo-pubescentibus; medulla brunnea lamellata; foliis subcoriaceis, ovatis vel oblongo-ovatis, 8-9.5 cm. longis, 4-5 cm. latis, apice longe caudato-acuminatis, basi oblique rotundatis, margine adpresse minute serrulatis, supra atro-viridibus glabris, subtus pallidis, secus venas leviter ferrugineo-granuloso-pubescentibus, costa supra prominente, subtus elevata, nervis lateralibus utrinsecus 5-7, arcuato-adscendentibus, prope marginem anastomosantibus, venulis minute reticulatis, subtus subprominentibus; petiolis 2-3 cm. longis, plus minusve ferrugineo-glanduloso-pubescentibus; inflorescentiis sub anthesi ignotis; ovario distincte ampullifero, glabro, stylis circiter 2.5 mm. longis; inflorescentiis post anthesin axillaribus, 1- vel 2-fructibus, plus minusve ferrugineo-granuloso-pubescentibus, pedunculis 5-7 mm. longis; pedicellis ad 1.8 cm. longis; fructibus immaturis viridibus, oblongis, circiter 2 cm. longis et 1 cm. crassis, glabris, apice valde rostratis.

Southern China, in Kwangsi, in open thickets, at an altitude of 1000 meters. Flowers unknown.

CHINA: Kwangsi: Yin-tung, Min-shan, N. of Lu-chen, near the Kweichow border, *R. C. Ching 6185* (NY, TYPE).



This species is admittedly established on rather inadequate material, but it seems clearly to represent an undescribed species. Its glabrous bottle-shaped ovary indicates distinctly and definitely its alliance with either the dark-flowered *A. purpurea* Rehd. or with the pale flowered *A. melanandra* Franch. It can be distinguished from the former by the smaller, narrower leaves and the brown pith, and from the latter by its leaves being not glaucous beneath. It is also distinct in having opposite branches, although the material at hand is not sufficient to indicate whether or not this is constant.

There is also the possibility that this may be the same as *A. longicauda* F. Chun, here classified as an imperfectly known species. However, as Chun's species is based on a specimen with staminate flowers only, while the present species is based on a young fruiting specimen, it is impossible critically to compare the two.

16. **Actinidia melanandra** Franch. in Jour. de Bot. 8: 278. 1894; Dunn in Jour. Linn. Soc. Bot. 39: 402. 1911, p. p.; Rehder in Sarg. Pl. Wils. 2: 378. 1915; Hand.-Mazz. Symb. Sin. 7: 390. 1931; Nakai in Bot. Mag. Tokyo 47: 252. 1933.

*Actinidia rufa* var. *parvifolia* Dunn in op. cit. 403. 1911.

High climbing shrubs to 7 m.; branches reddish, the very young shoots sometimes puberulous and slightly glaucous; pith lamellate, more or less whitish. Leaves chartaceous, elliptic or ovate to oblong-ovate or oblong-lanceolate, about 6–9.5 cm. long and 2.5–4 cm. broad, acuminate at apex, cuneate to rounded or truncate at base, sometimes unequal, the margins minutely serrulate, the teeth ascending, glabrous on both surfaces except for small tufts of rusty hairs in the axils of the secondary nerves on the lower surface, green above, glaucous beneath, the costa and veins slender, subconspicuous above, more or less raised and distinct beneath, the secondary nerves about 4–6 per side, arcuately ascending, anastomosing, the veinlets reticulate, inconspicuous to subconspicuous on both surfaces; petioles slender, 2.5–3 cm. long, glabrous or slightly puberulous. Inflorescence in 3- 5-flowered cymes or the flowers solitary, the peduncles and pedicels slightly puberulous, slender; pedicels to 1.8 cm. long; bracts linear, minute. Flowers white; sepals 5, occasionally 4, ovate, 6–7 mm. long, 3–4 mm. broad, acute at apex, glabrous, the margins sometimes ciliate, the base more or less connate; petals 5, rarely 4, white, sometimes brownish toward the base, oblong, 1.1–1.3 cm. long, 4–7 mm. broad, rounded at apex, gradually narrowed at base; stamens numerous, the filaments slender, about 3 mm. long, the anthers blackish when dry, slender, about 2 mm. long, acute and pointed at apex and sagittate at base; ovary bottle-shaped, glabrous, 6–7 mm. long, 2–3 mm. in diameter; styles 3.4 mm. long. Fruit ellipsoid to ovoid, glabrous, smooth, about 3 cm. long and 2.5 cm. across, not lenticellate.

CHINA: Hupeh: Western Hupeh, *E. H. Wilson* 1068 (A, NY, US), 1068a (A, NY, US), 5938a (GH); Fang Hsien, *E. H. Wilson* 4459 (A).

Szechuan: Kuan Hsien, *W. P. Fang* 2364 (A, NY); Ch'eng-k'ou Hsien, *R. P. Farges* 79 (NY).

Dunn describes very briefly *A. rufa* var. *parvifolia*, basing it on *Henry* 5938a, 6644, and 6794, all from Hupeh. This is reduced to *A. melanandra* by Rehder. This species is readily distinguished from other species of this general region by the glaucous under surfaces of the leaves, which are glabrous except for the tufts of brownish hairs in the axils of the secondary veins on the lower surface. I cannot verify Handel-Mazzetti's record of this species in northeastern Yunnan, based on *Teng* 260. In the past *A. melanandra* has often been erroneously attributed by various authors to species of other regions, but it seems that the range of the present species is limited to western China (in western Hupeh and Szechuan, and possibly also in northern Yunnan).

17. ***Actinidia hypoleuca*** Nakai in Bot. Mag. Tokyo **38**: 312. 1904, **47**: 256. 1933.

*Actinidia melanandra* sensu Finet & Gagnep. in Bull. Soc. Bot. France **52**, Mém. **4**: 21. 1905, p. p. (quoted Japanese plants), non Franch.

*Actinidia japonica* Nakai in Bot. Mag. Tokyo **28**: 311. 1914.

Climbing shrubs; branches grayish, the young branchlets much darker, glabrous, without lenticels or with small inconspicuous lenticels on older branches only; pith brown, lamellate, sometimes nearly solid. Leaves subchartaceous, ovate to ovate-oblong, about 2.5–7 cm. long, 2.5–4.5 cm. broad, abruptly acuminate at apex, broadly acute to rounded or truncate at base, the margins finely serrulate, glabrous and dark above, glaucous and glabrous beneath except with tufts of brown pubescence in the nerve-axils, the costa and veins inconspicuous above, dark above, glaucous and glabrous beneath except with tufts of brown veins about 4 or 5 per side, straight or slightly arcuate-ascending, anastomosing, the veinlets finely reticulate, inconspicuous above, sub-conspicuous beneath; petioles 2–3.5 cm. long, dark purple, glabrous. Inflorescences in small axillary cymes of 1–5 or more flowers, glabrous or slightly pubescent, the peduncles slender, to 5 mm. long, the pedicels slender, to 10 mm. long. Flowers white; sepals 5, ovate-oblong, to 6 mm. long and 3 mm. broad, glabrous or puberulous, acute to obtuse at apex, the margins often ciliate; petals 5, obovate, to 12 mm. long and 7 mm. broad, rounded at apex; stamens numerous, the filaments slender, about 3 mm. long, the anthers purple, oblong, about 2 mm. long, rounded at apex, slightly sagittate at base; ovary bottle-shaped, glabrous, about 5 mm. long and 2 mm. across, the styles 3–4 mm. long. Fruit ovoid, about 1.5 cm. across, glabrous, not lenticellate, slightly rostrate at apex.

Southern and central Japan. Flowers white.

JAPAN: Hondo: Satsuma prov., *G. Masamune* s. n. (NY); Mino prov., *K. Shiota* 4972 (A), 5722 (A), 6341 (A), 9699 (A); Kai prov., Tasko, *K. Sakurai* s. n. (A); Nonokawa, Tosa, *K. Watanabe* s. n. (GH). Sikoku: Nagasaki, *R. Oldham* 95 (GH).



This species differs from the closely allied *A. arguta* in the generally smaller leaves, which are usually glaucous beneath. Among the herbarium specimens, various degrees appear in the shade of leaf color, ranging from green to glaucous in leaves even from the same specimen. Nakai speaks of *A. arguta* as "easily discriminated from *A. hypoleuca* in the field by its green foliages."

The name *A. japonica* was first given by Nakai in Bot. Mag. Tokyo **27**: (163). 1913, in his key to Japanese species of *Actinidia*, and later a description was given in 1915. This species name is given as a synonym of *A. hypoleuca* Nakai (mistakenly as "*A. hypoglauca* Nakai") in Koidzumi's key (in Acta Phytotax. Geob. **9**: 97. 1940). The original description, though brief, is sufficient to prove that this reduction is justified. It is strange to note, however, that this name is never mentioned by Nakai himself in his subsequent discussions of this genus.

- 18. *Actinidia purpurea*** Rehder in Sarg. Pl. Wils. **2**: 378. 1915, in Jour. Arnold Arb. **15**: 96. 1934; Hand.-Mazz. Symb. Sin. **7**: 390. 1931; Nakai in Bot. Mag. Tokyo **47**: 253. 1933.

*Actinidia melanandra* Franch. var. *latifolia* E. Pritz. ex Diels in Bot. Jarhb. **29**: 470. 1900. *Syn. nov.*

*Actinidia rufa* var. *arguta* Dunn in Jour. Linn. Soc. Bot. **39**: 402. 1911, p. p. (quoted Henry 11008). *Syn. nov.*

*Actinidia rufa* var. *typica* Dunn in loc. cit., p. p. (quoted Henry 5622). *Syn. nov.*

*Actinidia chartacea* Hu in Bull. Fan Mem. Inst. Biol. Bot. **10**: 128. 1940. *Syn. nov.*

High climbing shrubs to 20 m.; branches glabrous or the very young branchlets puberulous, rarely tomentose, grayish brown; pith white, lamellate. Leaves thickly chartaceous, elliptic to elliptic-ovate or broad-ovate, 8–12 cm. long, 4.5–6.5 cm. broad, acute to acuminate at apex, acute to rounded or truncate at base, usually oblique, the margins serrulate, with appressed teeth, glabrous and dull above, nearly concolored or slightly paler beneath, glabrous or sparsely setose or tomentose along the costa and veins on the lower surface with or without tufts of whitish or yellowish hairs in the nerve-axils, the costa and nerves slender, subconspicuous above, distinct and elevated beneath, the secondary veins about 5 or 6 per side, arcuate-ascending, anastomosing, the veinlets reticulate, inconspicuous above, subconspicuous beneath; petioles 3–5 cm. long, glabrous or rarely tomentulose. Inflorescences in axillary cymes, puberulous, the staminate cymes often many-flowered, the pistillate usually 3-flowered. Flowers white; sepals 5, ovate, 4–7 mm. long, more or less unequal, obtuse at apex, often turning blackish on drying, glabrous or rarely puberulous, the margins ciliate; petals 5, ovate to oblong-ovate, often unequal, 7–12 mm. long, 4–7 mm. broad; stamens numerous, the filaments slender, 3–4 mm. long, the anthers oblong, blackish, 2 mm. long, the base divergent; ovary bottle-shaped, glabrous, about 6 mm. long and 2 mm. across,

the styles about 4 mm. long. Fruit ovoid or oblong, about 2-2.5 cm. long, purplish, glabrous, the apex rostrate.

CHINA: Hupeh: Without precise locality, *E. H. Wilson 1029a* (A), 5622 (G); Nan-t'o, *E. H. Wilson 1165* (A, NY, US). Hunan: Heng-shan, *H. Handel-Mazzetti 12212* (A). Szechuan: Without precise locality, *E. H. Wilson 3269* (A); Pao-hsing Hsien (Mu-ping), *E. H. Wilson 1314* p. p. (A, US, GH, TYPE:), 1314a (A); Mo-tien-ling, *F. T. Wang 22445* (A), 22478 (A); O-mei-shan, *Y. S. Liu 1230* (A), *C. Y. Chiao & C. S. Fan 286* (A), 336 (A), *H. C. Chow 7645* (A), 12179 (A). Sikang: Kan-ting Hsien (Tachienlu), *E. H. Wilson 1314* p. p. (A), *C. Y. Chiao 2029* (A), 2040 (A). Yunnan: Without precise localities, *F. Ducloux 465* (NY), *G. Forrest 14845* (A), 16223 (A), *H. T. Tsai 57168* (A), 57569 (A), 57325 (A); Yangtze-Mekong divide, *H. Handel-Mazzetti 7873* (A); Mekong-Salwin divide, *G. Forrest 19483* (A, US), *J. F. Rock 22720* (A, NY); Wei-hsi Hsien, *H. T. Tsai 57911* (A), *C. W. Wang 63608* (A), 63704 (A), 64046 (A), 68660 (A), 70423 (A); Chung-tien, *K. M. Feng 3341* (A); south of Red River, from Man-mei, *A. Henry 9694* (A, NY); Meng-tzu, *A. Henry 11008* (A, NY, US); Lan-p'ing Hsien, *H. T. Tsai 54000* (A); P'ing-pien Hsien, *H. T. Tsai 62468* (A); Lan-ts'ang Hsien, *C. W. Wang 76627* (A). Kweichow: San-ho Hsien, *Y. Tsiang 6435* (NY); Tu-shan Hsien, *Y. Tsiang 6761* (NY).

This species is the counterpart of *A. arguta* in southwestern China, and it differs from the latter in the relatively longer, narrower leaves that are never setose and with appressed serrations close to the margins, the generally smaller flowers, and the long, dark, purple-colored fruits. It was originally included in the concept of *A. arguta* Dunn, who cited specimens such as *Henry 5622* and *11008* which were later designated as types of Rehder's *A. purpurea*. *Wilson 1512* from Kiangsi, a sterile specimen with setose hairs, evidently does not belong here as originally cited by Rehder but should be referred to *A. arguta*.

A photograph of the type of *A. melanandra* Franch. var. *latifolia* Pritzl is also in the herbarium of the Arnold Arboretum. It is from Nan-ch'üan, in Szechuan province, collected by V. Rosthorn in 1891. The original description is very brief, referring only to the size of the leaves, "foliis latis 8-9 × 6-7.5 cm.", but the photograph clearly shows that not *A. melanandra* Franch. but *A. purpurea* Rehder is represented.

*Actinidia chartacea* Hu, another name to be reduced, is from northwestern Szechuan, "Mo-Tien-Ling . . . F. T. Wang, no. 2245a (type), Aug. 31, 1930." Hu compares his plant with *A. kolomikta* Maxim. and also with *A. latifolia* Merr., the latter being a widely different plant with stellate tomentum and spotted fruit. Hu's type is not now available, but two collections made by the same collector from the type locality at the same time when the type was collected, *F. T. Wang 22445* and *22478*, clearly represent the same plant. They are unquestionably *A. purpurea*. As Hu's description also fits the latter species perfectly, it is believed desirable also to reduce *A. chartacea* to synonymy.

The species *A. purpurea*, as mentioned above, is very close to *A. arguta*, and it remains to be seen whether it will eventually be advisable



to revert to the broader concept of Dunn and treat this as a variety of *A. arguta*.

19. ***Actinidia arguta*** (Sieb. & Zucc.) Planchon ex Miq. in Ann. Mus. Bot. Lugd.-Bat. 3: 15. 1867.

Climbing shrubs to 7 m.; branches glabrous or the very young branchlets puberulous, rarely tomentose, grayish brown, the lenticels absent on younger branches, small and inconspicuous on mature ones; pith white to brown, lamellate. Leaves membranaceous to chartaceous, elliptic-ovate to broadly ovate, 8–12 cm. long, 4.5–7.5 cm. broad, abruptly acuminate at apex, rounded to subcordate at base, rarely cuneate, usually oblique, the margins sharply serrate, glabrous and dull above, nearly concolored or slightly paler beneath, glabrous to rusty-tomentose to setose on one or both surfaces, especially beneath, with or without tufts of whitish or yellowish hairs in the axils of the secondary veins beneath, the costa and veins slender, subconspicuous above, distinct and raised beneath, the secondary veins about 5 or 6 per side, arcuate-ascending, anastomosing, the veinlets reticulate, inconspicuous above, subconspicuous beneath; petioles 3.5–8 cm. long, glabrous or rusty-tomentose, sometimes setose. Flowers white, in axillary cymes, puberulous, the staminate cymes often many-flowered, the pistillate with 1–3 or more flowers; sepals 5, ovate, 5–7 mm. long, obtuse at apex, the margins ciliate, glabrous or rarely puberulous without; petals white; brownish at base, ovate to oblong-ovate, often unequal, 7–12 mm. long, 4–7 mm. broad; stamens numerous, the filaments slender, 3–4 mm. long, the anthers blackish when dry, oblong, 2 mm. long sagittate at base; ovary bottle-shaped, about 6 mm. long and 2 mm. across, glabrous, the styles about 4 mm. long. Fruit ovoid or oblong, about 2–2.5 cm. long, greenish yellow, glabrous, not lenticellate, the apex rostrate.

*Actinidia arguta* was broadly defined by Dunn to include forms ranging from Yunnan to Manchuria and Japan. Subsequently the species *A. purpurea* was segregated by Rehder and the species *A. platyphylla* A. Gray reinstated by Japanese botanists. The present study, based on a large series of specimens from all these localities, suggests that it is advisable to return to the somewhat broad concept of Dunn. The several varieties here recognized occur in more or less contiguous areas and pass into each other imperceptibly by intergrading forms. Clearly this is another of the very widespread, more or less polymorphic species characteristic of the genus *Actinidia*. As a species in its broad sense, it probably should include also *A. purpurea* and *A. hypoleuca*; it is characterized by the long-petioled, more or less membranaceous leaves, generally glabrous except for the veins and the nerve-axils, the petals frequently purplish at base, the purple sagittate anthers, the glabrous bottle-shaped ovary, and the smooth short-rostrate fruits.

## KEY TO THE VARIETIES

- A. Leaves membranaceous to chartaceous, rounded to subcordate at base, glabrous or setose along the costa beneath.
- B. Leaves membranaceous to subchartaceous; young shoots and leaves as well as inflorescence glabrate except along the veins of the lower surfaces of the leaves. . . . . a. var. *arguta*.
- BB. Leaves subchartaceous; young shoots and leaves as well as inflorescence usually rusty-tomentose. . . . . b. var. *rufa*.
- AA. Leaves chartaceous, relatively shorter, broader, cordate at base, more setose on the veins beneath. . . . . c. var. *cordifolia*.

19a. *Actinidia arguta* var. *arguta*.

*Actinidia arguta* (Sieb. & Zucc.) Planchon ex Miq. in Ann. Mus. Bot. Lugd.-Bat. **3**: 15. 1867; Nakai in Bot. Mag. Tokyo **47**: 256. 1933.

*Trochostigma arguta* Sieb. & Zucc. in Abh. Akad. Wiss. München **3**: 727. 1843.

*Actinidia rufa* var. *arguta* Dunn in Jour. Linn. Soc. Bot. **39**: 402. 1911.

*Actinidia giraldui* Diels in Bot. Jahrb. **36**: Beibl. **82**: 75. 1905; Dunn in Jour. Linn. Soc. Bot. **39**: 403. 1911. *Syn. nov.*

*Actinidia megalocarpa* Nakai ex Nakai & Kitagawa in Rep. 1st Sci. Exp. Manch. IV. **1**: 9, t. 3. 1933 (Pl. Nov. Jehol.) *Syn. nov.*

Leaves membranaceous to subchartaceous, elliptic-ovate to broad-ovate, 8–12 cm. long, 4.5–7.5 cm. broad, abruptly acuminate at apex, rounded to subrounded at base, rarely cuneate, usually oblique, glabrous or sparsely setose along the costa and veins on both surfaces, especially beneath, with or without tufts of whitish or yellowish hairs in the nerve-axils beneath; inflorescences puberulous.

Eastern Siberia, Manchuria, and northern China to Korea and Japan, in thickets at altitudes of 100–2000 meters. Flowers white, the anthers purple, June.

CHINA: Manchuria: Hsiao-ling, *P. H. & J. H. Dorsett* 29 (US), *P. H. Dorsett* 4086 (A, NY); Sui-fen-ho, *B. V. Skvortzov s. n.* (A); Kao-ling-tzu, *B. V. Skvortzov s. n.* (A); Mao-erh-shan Station, *B. V. Skvortzov s. n.* (A); Mifun Station, *B. V. Skvortzov s. n.* (A); Port Bruce, *Maximowicz s. n.* (GH). Chahar: Yang-chia-p'ing, *C. W. Wang* 61824 (A); "Pao-feng-ssu," *C. W. Wang* 60813 (A), 60816 (A). Hopei: Without precise locality, *C. F. Li* 11167 (NY); Ming-ling, *K. M. Liou* 618 (NY). Shansi: Ling-shih Hsien, *T. Tang* 904 (NY); Chieh-hsiu Hsien, *H. Smith* 5444 (A). Shensi: Kuan-yin-shan, *J. Giraldui s. n.* (A). Honan: Sung Hsien, *J. Hers* 501 (A), 567 (A), 1265 (A); Lu-shih Hsien, *J. Hers* 867 (A), 1143 (A), 1180 (A). Shantung: Lao-shan, *C. Y. Chiao* 2856 (A, NY, US). Kiangsu: Tung-hai Hsien (Haichow), *J. Hers* 645 (A). Anhwei: Wu-yuan Hsien, *R. C. Ching* 3254 (A); Huang-shan, *R. C. Ching* 3046 (A). Chekiang: T'ien-mu-shan, *H. H. Hu* 1583 (A).

KOREA: Pyongyang. *Mrs. R. K. Smith s. n.* (US); Taiyudo, prov. Heian, *E. H. Wilson* 8642 (A, US), Kongo-san, prov. Kogan, *R. K. Beattie* 10454 (A, US), *E. H. Wilson* 10718 (A); Mt. Aiensan, *U. Faurie* 496 (A).

JAPAN: Hokkaido: Sapporo, *S. Takenobu s. n.* (GH), *S. Arimoto s. n.* (GH), *Y. Tokubuchi s. n.* (GH), *E. Tokubuchi s. n.* (GH), *C. Wilford s. n.* (GH), *Maximowicz s. n.* (GH, US); Abashiri, *E. H. Wilson s. n.* (A).



Hondo : Yoshino (Yamato), *Tokyo Mus.* 76 (US); Yokohama, *Maximowicz s. n.* (US); Hakone, Sengoku, *T. Sawada* 2218 (A); Mino prov., *K. Shiota* 7712 (A), 7781 (A); Lake Chuzenji, *J. G. Jack s. n.* (A), *E. H. Wilson s. n.* (A), *C. S. Sargent s. n.* (A); Mt. Tamigawa, Niigata, *S. Suzuki* 993024 (A). Shikoku : Iyo, *Y. Ikkaku* 9527 (A).

The specific names *A. arguta* and *A. rufa* are effected by Miquel who credits them to Planchon. They are based on *Trochostigma arguta* Sieb. & Zucc. and *T. rufa* Sieb. & Zucc. respectively. Dunn considers them as separate varieties of the same species, *A. rufa* var. *typica* and *A. rufa* var. *arguta*. Nakai maintains them as two distinct species. Maximowicz in 1886 was the first to unite the two species, and he took up the name *A. arguta* for the aggregate. This view is followed by most subsequent authors. As noted by Rehder, *A. arguta*, the name chosen by the first author to unite the concepts, must be adopted.

Nakai considers as *A. arguta* the common species in Japan which is found nearly everywhere, while, *A. rufa*, considered by him as distinct, is limited only to the extreme south in Kiusiu as well as the Liukius. As the two are differentiated by him only in the degree of indument, they seem hardly to merit specific recognition. Among the available specimens, it is hard to find constant differences. Thus these two are retained as varieties as given earlier by Dunn, but the range of *A. arguta* var. *rufa* is found not to be strictly limited to the south as indicated by Nakai. A specimen of Oldham's collection, probably from Korea, which bears Nakai's identification as "*A. rufa*" clearly belongs to this same form. Rehder and others treat *A. rufa* and *A. arguta* as exact synonyms.

A photograph of the holotype of *A. girdalii* Diels, *Girdaldi* 4065, from southern Shensi, is in the herbarium of the Arnold Arboretum. It matches exactly a specimen in the same herbarium collected by Girdaldi in 1897 from the same locality and determined by Rehder as *A. purpurea*. The setose leaves as shown by the specimen and described by Diels, clearly indicate that *A. girdalii* is referable to *A. arguta* rather than *A. purpurea*.

Nakai's *A. megalocarpa* from Jehol, Chang-Shan-Yu, based on "N. H. K. Sept. 13, 1933," differs, according to the author, from *A. arguta* in the thinner leaves and larger fruits. The latter measure  $2 \times 4$  cm. Basing one's opinion on his description and illustration, it seems quite safe to refer this name to *A. arguta*.

Among the above cited specimens is a collection made by C. Y. Chiao, no. 2856, from Lau Shan, Shantung. This was originally determined as *A. polygama*, but the lamellate instead of solid pith clearly eliminates it from that species. Four specimens of this number are observed, all of them sterile. These specimens, so far as the vegetative characters can show, belong to *A. arguta*. I suspect that the record of *A. polygama* from Lau Shan, Shantung, as given by Gilg & Loesener in *Bot. Jahrb.* **39**: Beibl. **75**: 52. 1904, based on a Zimmerman collection, should actually be referred to *A. arguta*.

The pith of *A. arguta* is sometimes solid and at other times, especially at the very central part, it becomes compactly lamellate, particularly in older stems. When the pith is solid, it is small, of very firm texture, and slightly pinkish colored like the wood; thus it is very different from the solid, pure white, very large, and spongy pith of *A. polygama*.

19b. ***Actinidia arguta* var. *rufa*** (Sieb. & Zucc.) Maximowicz in Bull. Acad. Imp. Sci. St. Pétersb. **31**: 1886, in Mel. Biol. **12**: 424. 1886.

*Trochostigma rufa* Sieb. & Zucc. in Abh. Akad. Wiss. München **3**: 727, t. II, f. d8-d13. 1843.

*Actinidia rufa* Planchon ex Miq. in Ann. Mus. Bot. Lugd.-Bat. **3**: 15. 1876 (Pro. Fl. Jap. 203); Nakai in Bot. Mag. Tokyo **47**: 257. 1933.

*Actinidia callosa* var. *rufa* Makino in Bot. Mag. Tokyo **16**: 147. 1901.

*Actinidia rufa* var. *typica* Dunn in Jour. Linn. Soc. Bot. **39**: 402. 1911.

Leaves subchartaceous, ovate to broad-ovate, 6–10 cm. long, 5–10 cm. broad, cordate to truncate at base, glabrous except in the nerve-axils on the under surfaces; inflorescence mostly tomentose.

Liukiu, Korea, and Japan. Flowers white, anthers purple, June.

JAPAN: Hondo: Kai prov., Pass Sasaro, No. coll. (US).

KOREA: "Korea arch. ?, Pt. Hamilton," Oldham 94 (GH).

LIUKIU: Takanosima & Onshima, C. Wright 31 (GH).

19c. ***Actinidia arguta* var. *cordifolia*** (Miq.) Bean, Trees & Shrubs Brit. Isl. **1**: 162. 1914.

*Actinidia cordifolia* Miq. in Ann. Mus. Bot. Lugd.-Bat. **3**: 15. 1876. (Prol. Fl. Jap.).

*Actinidia platyphylla* A. Gray ex Miq. l. c.; Nakai in Bot. Mag. Tokyo **47**: 258. 1933.

*Actinidia rufa* var. *cordifolia* Dunn in Jour. Linn. Soc. Bot. **39**: 403. 1911.

*Actinidia rufa* var. *dulcisima* Koidzumi in Bot. Mag. Tokyo **44**: 100. 1930. *Syn. nov.*

Leaves subchartaceous, broad-ovate, about 4–9 cm. long, 5–10 cm. broad, distinctly cordate at base, the costa and veins more setose beneath; inflorescence rusty-tomentose.

Japan and Korea, in thickets. Flowers white, anthers purple, June.

JAPAN: Hokkaido: Cape Sangar, J. Small s. n. (GH, TYPE of *A. platyphylla* Gray); between Shojiko & Kofu, Dorsett & Morse 560 (US); Niigata pref., Mt. Tanigawa, S. Suzuki 398025 (A). Hondo: Misaka Pass, E. H. Wilson s. n. (A); Nanokawa, Tosa, K. Watanabe s. n. (GH); Kai, Gunnai, K. Sakurai s. n. (A).

KOREA: Oo-ryong-too, E. H. Wilson 8542 (A).

There is some confusion with regard to the synonymy of this variety. Miquel's *A. cordifolia* is based on "Unicum exemplar legit Pierot in sylva ad upain fluvii Asija Gawa prope Kojanosa ins. Kiusiu." When Dunn proposed the variety *A. rufa* var. *cordifolia*, it was clearly based on Miquel's *A. cordifolia* as the latter is cited in the synonymy. Among the two specimens he cited is "Cape Sangar, Wright." This is evidently the type collection of *A. platyphylla* A. Gray, quoted by Miquel as a

number of J. Small. The holotype is in the Gray Herbarium, a J. Small specimen in C. Wright's collection. Dunn was apparently unaware of this fact, as he cited, "fide Bretschneider," *A. platyphylla* A. Gray in the synonymy of *A. kolomikta* Maxim. This was followed by Rehder, in Sarg. Pl. Wils. 2: 381. 1915. Nakai has had access to the type of *A. platyphylla* A. Gray, as he cited the Wright number from both Gray and Paris, and relegated *A. rufa* var. *cordifolia* Dunn to the synonymy of *A. platyphylla* A. Gray. However, the species *A. cordifolia* Miq., the basis of Dunn's variety, was cited by Nakai under *A. arguta* Planch. ex Miq. He gives no reason for doing so, and apparently he has not had access to the type of *A. cordifolia* Miq., a Pierot number from Kiusiu. In Rehder's Bibliography (Bibl. Cult. Trees & Shrubs 459. 1949) both *A. cordifolia* Miq. and *A. platyphylla* A. Gray are listed in the synonymy of *A. arguta* var. *cordifolia* (Miq.) Bean.

Koidzumi, in Bot. Mag. Tokyo 44: 100. 1930, considers *A. arguta* var. *cordifolia* Dunn as distinct from *A. cordifolia* Miq. *Actinidia arguta* is recognized by him as a synonym of *A. platyphylla* A. Gray, of which he cites no specimen. *Actinidia arguta* var. *cordifolia* Dunn is renamed *A. rufa* var. *dulcissima* Koidz., of which no description is given but for which two collections, Pierot 445 and C. Wright s. n., are cited. The Pierot collection from Kiusiu is most probably that on which Dunn based his species. No reason is given by Koidzumi for renaming Dunn's variety. As I consider that *A. rufa* var. *cordifolia* Dunn, *A. cordifolia* Miq., and *A. platyphylla* A. Gray are all synonymous with *A. arguta* var. *cordifolia*, Koidzumi's varietal name is thus also included. That this name is superfluous may have been later realized by Koidzumi himself, as in his key to the Japanese species of *Actinidia* (in Acta Phytotax. Geob. 9: 97-99. 1940) *A. cordifolia* Miq. is again recognized by him, while his own *A. rufa* var. *dulcissima* is not mentioned at all.

20. ***Actinidia rubricaulis*** Dunn in Kew Bull. 1906: 2. 1906, in Jour. Linn. Soc. Bot. 39: 407. 1911 p. p. (excluding Wilson 3271 & 4764).

Large climbing shrubs; branches reddish brown to purple, lenticellate, glabrous to minutely hirsute when young; pith solid, whitish, firm. Leaves chartaceous, oblong-lanceolate to ovate-oblong, about 8-10.5 cm. long and 1.2-3.8 cm. broad, acuminate at apex, cordate to sub-rounded at base, generally oblique, the margins laxly serulate, the teeth sometimes glandular, glabrous on both surfaces, the upper surface dark, the lower much paler, the costa and veins inconspicuous above, distinct and raised beneath, the secondary veins 6 or 7 per side, distinctly arcuate-ascending, anastomosing, the veinlets reticulate, inconspicuous above, subconspicuous beneath; petioles 1-2.5 cm. long, glabrous or minutely hirtellous. Flowers usually scattered on short lateral branches, the peduncles solitary, the lower ones lateral, the upper axillary or the flowers in axillary fascicles of up to 5; pedicels or peduncles glabrous, to 1.3 cm. long, with or without a minute linear bract at the middle;



sepals 5, mostly unequal, oblong, to 4.5 mm. long and 3 mm. broad, obtuse to rounded at apex, the margins usually ciliate; petals 5, often unequal, oblong-lanceolate, to 7.5 mm. long and 4.5 mm. broad, rounded at apex; stamens numerous, the filaments slender, 3.5 mm. long, the anthers ovoid, yellow, about 1.5 mm. long, rounded at apex, slightly sagittate at base; rudimentary ovary pellucid-pilose. Fruit ovoid, about 1.6 cm. long and 1.3 cm. across, glabrous, lenticellate; persistent sepals reflexed, the styles about 2-3 mm. long.

Southwestern China, in southern Yunnan only, in mountain forests at altitudes of about 1500-2300 meters. Flowers whitish.

CHINA: Yunnan: Feng-ch'un-ling, south of Red River, *A. Henry 10696* (A, NY, US, COTYPES); Meng-tsu, *A. Henry 11334* (A, NY, COTYPES); P'ing-pien Hsien, *H. T. Tsai 62669* (A).

The two Henry numbers are the two original collections cited by Dunn. In 1911, Dunn also listed *Wilson 3271 & 4764*, from O-mei-shan, as belonging to this species. However, in Rehder's treatment (in Sarg. Pl. Wils. 2: 381. 1915), these two numbers are included in *A. tetramera* Maxim. I agree with Rehder that these two should not be referred to *A. rubricaulis*. The latter species, therefore, is limited in its range to southern Yunnan.

Dunn describes the plant as wholly glabrous, but upon close examination the young shoots are found to be minutely hirsute. *Henry 10696* is from a male flowering plant with narrow oblong-lanceolate leaves. *Henry 11334* is a fruiting specimen with quite different leaves, which are ovate-oblong, relatively much shorter and broader. In other characters the two are clearly of the same species, as especially evidenced by the firm solid pith, which appears to be a very characteristic feature of this species, overlooked by Dunn. The field labels show that the two collections are from two different localities and are not from the same place, as cited by Dunn. *Tsai 62669* is a young fruiting specimen, the only collection of the species since it was described from the original material.

Only rudimentary ovaries in the staminate flowers are observed. Dunn originally described these as "praeter lanan circa stylos glabrum." In his later revision of the genus, he characterized the species as having glabrous ovaries and he accordingly differentiated it in his key from *A. callosa* and *A. coriacea*, which have pubescent ovaries. This was apparently due to his inclusion of the two Wilson collections noted above that should properly be placed in *A. tetramera*, a species with distinctly glabrous ovaries.

Another characteristic feature of this species which Dunn fails to note is the presence of flowers usually on short lateral branches, especially on the lower leafless part. This is true in both staminate and pistillate specimens. This phenomenon is also found in *A. coriacea*, another species with solid pith, and it indicates their close relationship. The flower color of *A. rubricaulis* is not recorded by Dunn, but is indicated by the collector on one sheet (NY) of *Henry 10696* as whitish.

21. **Actinidia fortunatii** Finet & Gagnep. in Bull. Soc. Bot. France **53**: 574. 1906, as *A. fortunati*; Dunn in Jour. Linn. Soc. Bot. **39**: 409. 1911; Lév. Fl. Kouy-Teheou **413**. 1915; Rehder in Jour. Arnold Arb. **15**: 97. 1934.

*Actinidia dielsii* Lév. in Rep. Sp. Nov. **13**: 175. 1914.

*Actinidia glaucophylla* F. Chun in Sunyatsenia **7**: 11, pl. 3. 1948. *Syn. nov.*

High climbing shrubs to 10 m.; branches dark reddish brown, glabrous, the young branchlets sometimes with densely rusty-pubescent buds; pith small, lamellate, white. Leaves thin- to thick-chartaceous, lanceolate to elliptic-lanceolate, rarely ovate-oblong, about 8–14 cm. long and 1.8–3.5 cm. broad, sometimes to 14 cm. long and 7.5 cm. broad, long-acuminate to rarely acute at apex, obliquely but distinctly cordatulate at base, the upper surface generally green, glabrous, rarely sparsely setose and slightly puberulous along the costa when young, the lower surface glabrous, mostly glaucous, sometimes puberulous along the costa and veins when young, the costa and veins subconspicuous above, elevated and distinct beneath, the secondary veins about 8–10 per side, the veinlets reticulate, inconspicuous above, subconspicuous to conspicuous beneath; petioles 1–2 cm. long, glabrous, sometimes pubescent. Flowers reddish, the staminate in short, small cymes, the pistillate often solitary; pedicels slender, to 5 mm. long, slightly pubescent to glabrate; bracts linear, minute; sepals 5, ovate, about 4 mm. long and 2.5 mm. broad, often unequal, obtuse at apex, glabrate; petals 5, obovate, about 7 mm. long and 3.5 mm. broad, rounded at apex; stamens numerous, the filaments 3–4 mm. long, the anthers yellow, 1–1.5 mm. long, rounded at apex, slightly sagittate at base; ovary conical-ovoid, slightly pellucid-pilose, later glabrate. Fruit cylindric, oblong, to about 2.2 cm. long and 2 cm. across, glabrous, lenticellate, blackish.

Southern China (southern Hunan, Kweichow, Kwangsi, and Kwangtung), in thickets at altitudes of 400–1300 meters. Flowers reddish or pinkish, June.

CHINA: Hunan: Hsin-ning Hsien, *C. S. Fan & Y. Y. Li* 497 (A). Kweichow: Kuei-ting, *Y. Tsiang* 5480 (NY). Kwangsi: Ling-ch'üan Hsien, *W. T. Tsang* 28427 (US); N. Lu-chen, *R. C. Ching* 5828 (NY), 6085 (NY). Kwangtung: Lo-ch'ang, *C. L. Tso* 20632 (NY), *W. T. Tsang* 20803 (NY); Yao-shan, *S. S. Sin* 9460 (NY); Ju-yüan Hsien, *S. P. Ko* 52844 (A).

This species is not classified by Dunn in his key. He says: "In the absence of fruit or female flowers it is not possible to decide into which of the three sections it falls. Its long narrow cordate leaves distinguish it from all other species here enumerated."

A photograph of the type, *Cavalerie & Fortunat* 235, from Kweichow, is in the herbarium of the Arnold Arboretum. The specimens now available show that the fruits are oblong, glabrous, and lenticellate. It is clearly associated with the *A. callosa* group and especially with *A. coriacea*, which has similarly reddish flowers.

*Actinidia dielsii* Lév., as noted by Rehder, is reduced to the synonymy of *A. fortunatii* by Léveillé himself. *Actinidia glaucophylla* F. Chun is based on *S. P. Ko* 52835 (type), 52844 and 52886, all from Ju-yüan, Kwangtung. Of these, a specimen of 52844 is available. This specimen, as well as the original description and illustration, shows that without doubt the species in question belongs to *A. fortunatii*, a very characteristic species readily recognized by the narrow elliptic-lanceolate leaves with a distinct cordatulate base and by the reddish flowers.

The series of specimens now available shows that the species is also a very variable one. The indumentum and leaves, as well as the flower-color, show variations. While the plant has a decidedly glabrous appearance, hairs may be found occasionally on young shoots, buds, and pedicels. *Tsang* 20803, a vegetative shoot, has the stem rusty-tomentose and the leaves hairy on the costa on both surfaces. Some of the leaves are also sparsely setose above. The leaves of the different specimens may be very distinctly glaucous in some and partly glaucous, slightly glaucous, or not at all glaucous in others. *Ching* 5828, evidently a very vigorous flowering branch, has unusually large broad leaves measuring 14 cm. long and 7.5 cm. broad. In spite of this great difference in size, all other characters indicate that it clearly belongs to this species, which is of polymorphic habit like most other species of the genus.

22. ***Actinidia coriacea*** (Finet & Gagnep.) Dunn in Jour. Linn. Soc. Bot. **39**: 405. 1911; Rehder in Sarg. Pl. Wils. **2**: 384. 1915; Stapf in Bot. Mag. **152**: t. 9140. 1928; Hand.-Mazz. Symb. Sin. **7**: 390. 1931.

*Actinidia callosa* Lindl. var. *coriacea* Finet & Gagnep. in Bull. Soc. Bot. France **52**: Mém. **4**: 20. 1905 (Contr. Fl. As. Or.).

Climbing shrubs to 10 cm.; branches reddish brown, glabrous or nearly so; pith solid, firm, whitish or yellowish. Leaves thickly coriaceous, oblong to oblong-ovate, about 10–16 cm. long, 3–5 cm. broad, acuminate at apex, shortly acute to cuneate at base, usually oblique, the margins more or less remotely mucronulate-serrate to sharply serrate toward the apex, the tips of serrations often reddish-glandular, glabrous on both surfaces, the upper surface green, the lower paler, the costa sulcate above, thick and slightly raised beneath, the secondary veins about 6 or 7 per side, slender, arcuate-ascending, anastomosing, inconspicuous above, scarcely raised and subconspicuous beneath, the veinlets reticulate, inconspicuous on both surfaces; petioles 1.5–2.5 cm. long, glabrous. Flowers reddish, solitary or in 2–4-flowered cymes arranged along short branches which are leafy above and leafless below, the lower flowers lateral, the upper axillary; pedicels slender, up to 2.2 cm. long, glabrous; sepals 5, ovate, about 4–5 mm. long and 3.5 mm. broad, obtuse at apex, glabrous without, sometimes white-puberulent inside, ciliate along the margins; petals 5, suborbicular, red with



whitish or yellowish margins, about 7–10 mm. long and 4–7 mm. broad, the apex rounded, the base narrowed; stamens numerous, the filaments red, about 3–4 mm. long; anthers yellow; ovary conical, about 2.5 mm. long and 1.5 mm. across, densely white-pubescent, the styles to 3 mm. long. Fruit ovoid or globose, to 2 cm. long, glabrous, brown, white-lenticellate.

Southwestern China (from Kweichow and Szechuan to northwestern Yunnan), in thickets at altitudes of 200–1000 meters. Flowers red, May–June.

CHINA: Szechuan: Without precise localities, *E. H. Wilson* 3272 (A), 3272a (A), *E. Faber* 72 (NY); Cheng-k'ou Hsien, *R. P. Farges* 1946 (NY); Hung-ya Hsien, *E. H. Wilson* 932 (A, GH, NY); O-mei-shan, *E. H. Wilson* 4760 (A), *W. P. Fang* 3306 (A), 12756 (A, US), *Chiao & Fan* 132 (A), *Y. S. Liu* 2145 (A); O-pien Hsien, *Y. S. Liu* 2003 (A); Lu-shan Hsien, *K. L. Chu* 4044 (A); Nan-ch'uan Hsien, *W. P. Fang* 796 (A, NY, US), 5654 (A, NY); Ch'ia-ting Hsien, *S. C. Sun & K. Chang* 25 (A), 1512 (A), *L. Y. Tai* 643 (A), 832 (A), 1289 (A), 1541 (A); Ch'i-chiang Hsien, *W. P. Fang* 1430, (A, NY); Kuan Hsien, *W. P. Fang* 2113 (A, NY); Chiang-yu Hsien, *W. P. Fang* 2223 (A). Sikang: Tien-ch'uan Hsien, *L. Y. Tai* 4172 (A). Kweichow: Tsun-i Hsien, *Steward, Chiao & Cheo* 136 (A, NY, US); Shih-ch'ien Hsien, *Y. Tsiang* 4108 (NY); T'ung-tzu Hsien, *Y. Tsiang* 5010 (NY); Tu-yun Hsien, *Y. Tsiang* 5698 (NY); Chiang-k'ou Hsien, *Y. Tsiang* 7507 (NY); Yin-chiang Hsien, *Y. Tsiang* 7610 (NY), 7894 (NY).

This distinct species is characterized by the coriaceous, remotely glandular-serrulate leaves, and by the red flowers borne on separate leafless branches or along the leafless portion of the shoots. The pith is characteristically solid, firm, and more or less whitish or yellowish.

### 23. *Actinidia asymmetrica* F. Chun in Sunyatsenia 7: 13. 1948.

Climbing shrubs; branches reddish brown, longitudinally sulcate, glabrous, without lenticels or sometimes with a few pale oblong lenticels; pith white, medium-sized, lamellate. Leaves membranaceous or chartaceous, ovate-oblong, about 7–10 cm. long and 3.5–5.3 cm. broad, acute to acuminate at apex, auriculate-cordate at base, often unequally so, the margins irregularly callose-denticulate, glabrous on both surfaces, paler or even glabrescent on the lower surface, the costa and veins subconspicuous above, distinct and raised beneath, the secondary veins about 5–7 per side, arcuate-ascending, ending in the marginal teeth, the veinlets reticulate, inconspicuous except for a few parallel cross-bars; petioles 2–2.25 cm. long, glabrous; inflorescences in short 3–5-flowered axillary cymes, sometimes the flowers solitary; peduncles 1–1.5 cm. long, glabrous; pedicels 4–5 mm. long; bracts minute, subulate. Flowers pink; sepals 5, subequal, oblong, about 6 mm. long and 3 mm. broad, acute to obtuse at apex, glabrous, the margins slightly ciliate; petals 5, obovate to obovate-oblong, about 8 mm. long and 6 mm. broad, rounded at apex, contracted at base; stamens numerous, the filaments about 3 mm. long, the anthers yellow, about 1.8 mm. long, ovary cylindric-oblong, about 3 mm. long and 2 mm. across,

densely yellowish-villose, the styles about 2 mm. long. Fruit cylindrical ovoid, about 2.2 cm. long and 8–10 mm. across, brown, with lenticels, glabrous or slightly pubescent toward the tip; seeds oval, 1.5 mm. long, 1 mm. broad, foveolate-reticulate.

Southern China, in Kwangsi only, on mountain slopes at an altitude of about 1360 meters. Flowers reddish.

CHINA: Kwangsi: Ling-yüan Hsien, *Steward & Cheo* 672 (NY); Nan-ning Hsien, Shih-wan-ta-shan, *R. C. Ching* 8362 (NY); Shang-ssu Hsien, Shih-wan-ta-shan *W. T. Tsang* 23833 (NY), 24120 (NY).

The type, a flowering specimen, is *Liu* 566 (*Sunyatsen Herb.* 86950), from Wu-ming, Ta-ming-shan, Kwangsi. It has not been seen by me. Among the above cited specimens, the Ching and Tsang numbers are fruiting specimens. *Steward & Cheo* 672 has female flowers and young fruits.

The fruit of this species, not known when it was first described, appears to be very characteristic in its nodding position and slender shape. This species is also distinctly characterized by the leaf with auriculate-cordate base. Chun emphasizes particularly the asymmetrical shape of the leaf-blade, but this is not an exclusive character for the species. Most species of the genus have some leaves that are asymmetrical in shape. It is a common phenomenon in most climbing vines and is probably due largely to environmental rather than genetic factors.

24. ***Actinidia pilosula*** (Finet & Gagnep.) Stapf ex Hand.-Mazz.  
Symb. Sin. 7: 390. 1933.

*Actinidia callosa* Lindl. var. *pilosula* Finet & Gagnep. in Bull. Soc. Bot. France 52: Mém. 4: 19, 20. 1907; Dunn in Jour. Linn. Soc. Bot. 39: 406. 1911.

Climbing shrubs to 7 m.; branches reddish brown, with scattered short ovoid lenticels, glabrous or the young branchlets sparsely whitish-pubescent; pith more or less large, white, thinly lamellate. Leaves membranaceous, ovate-oblong, 5–12 cm. long, 3–6.5 cm. broad, acuminate at apex, broadly truncate at base, often unequal, the margins finely mucronulate-serrulate, the teeth more or less glandular, dark green above, nearly concolored or very slightly paler beneath, slightly but distinctly white-pubescent along the costa, the costa and veins subconspicuous above, purplish and conspicuous but not raised beneath, the secondary veins about 7 or 8 per side, arcuate-ascending, anastomosing, the veinlets reticulate, inconspicuous to subconspicuous beneath, ending in the marginal teeth; petioles purplish, long, slender, about 2–3.5 cm. long, white-pubescent to glabrate. Inflorescence in axillary cymes of about 5–7 flowers, brownish-tomentose; peduncles 1–1.5 cm. long; pedicels to 1 cm. long; bracts linear, small, 0–3 to a pedicel. Flowers brownish yellow; sepals 5, ovate, about 4–5 mm. long and 2–2.5 mm. broad, obtuse at apex, glabrous to slightly pubescent, the margins often ciliate; petals 5, obovate-oblong, about 7–9 mm. long and 4–5 mm. broad, rounded at apex; stamens numerous, the filaments slender, to

5 mm. long, the anthers yellow, ovoid, about 1 mm. long, rounded at both ends, the base not divergent; ovary elongate-cylindric, to 5 mm. long and 2.5 mm. across, pubescent when young, becoming glabrous, the styles about 2 mm. long. Young fruits oblong-cylindric, glabrous, not lenticellate, with persistent reflexed sepals.

Southwestern China (Yunnan) and northern Burma, in forest at altitudes of 2100–3300 meters. Flowers brownish yellow, June.

CHINA: Yunnan: Without precise locality, *G. Forrest* 6385 (A), 13910 (A), 19245 (A); "Tsekou," *R. P. Soulie* 1396 (A, ISOTYPE); Mekong Valley, *J. F. Rock* 8948 (A, NY, US), *Handel-Mazzetti* 8825 (A); Mekong-Yangtze divide, *G. Forrest* 19442 (A), *J. F. Rock* 25067 (A); Yung-shan Hsien, *H. T. Tsai* 51000 (A).

BURMA: Northern Burma, Adung Valley, *F. K. Ward* 9559a (A).

The type is from "Yunnan; Thra-na at Tsekou, 10–20 juin 1893, no 1396 (Soulie)", of which a duplicate is cited. This species is amply different from *A. callosa* in the very thin broadly truncate leaves, often hairy and setose above, the large thinly lamellate pith, and the brownish yellow flowers. The degree of pubescence varies considerably.

The specific combination was published by Handel-Mazzetti from the herbarium name indicated by Stapf. When Handel-Mazzetti published it he cited three collections, *Forrest* 13910 and *Handel-Mazzetti* 9042 and 9046. *Forrest* 13910 was once identified by W. W. Smith as "*A. championii* var. *mollis* Dunn." This number and *Handel-Mazzetti* 9042 are available, and they clearly prove to be *A. callosa* var. *pubescens* and not *A. pilosula* as Handel-Mazzetti originally indicated. The two are very different from *A. pilosula* in leaf and pith, as well as in floral characters. Clearly *A. pilosula* should be typified by Finet and Gagnepain's type, not by the specimens mistakenly identified by Handel-Mazzetti (and possibly also by Stapf) when the combination was effected and published.

The three yellow-flowered species, *A. pilosula*, *A. trichogyna*, and *A. venosa* are intimately related to each other. They are generally distinguishable, but at times intermediate forms are found. It may eventually prove desirable to combine the three as varieties of one species.

25. **Actinidia venosa** Rehder in Sarg. Pl. Wils. 2: 385. 1915; Hand.-Mazz. Symb. Sin. 7: 390. 1931, p. p.

*Actinidia callosa* forma D. Dunn in Jour. Linn. Soc. Bot. 39: 406. 1911.

Climbing shrubs to 9 cm.; branches purplish brown, with oblong whitish lenticels, the young branchlets puberulous to tomentose, soon glabrescent; pith large, white, lamellate. Leaves thin-chartaceous, ovate or ovate-oblong to elliptic and elliptic-oblong, about 5–15 cm. long, 3–6 cm. broad, rarely to 7.5 cm. broad, acuminate to long-acuminate at apex, mostly rounded at base and sometimes subcordate, usually obliquely so, the margins denticulate-serrulate, the upper surface dark green, glabrous or rarely sparsely setose when young, the lower



surface slightly paler, more or less tomentose on the veins when young, soon glabrescent or glabrous, the costa and veins conspicuous above, strongly raised and prominent beneath, the secondary veins 7–11 per side, nearly straight or arcuately ascending, anastomosing, the veinlets reticulate, with numerous closely parallel strongly raised and very prominent cross-bars; petioles slender, 1.5–4 cm. long, puberulous or glabrate at first, soon glabrous. Inflorescences in axillary cymes of 1–7 flowers, rusty-tomentose, the peduncles 5–10 mm. long, the pedicels almost as long; sepals ovate-oblong, about 5 mm. long, obtuse at apex, rusty-tomentose; petals elliptic-oblong, about 8–10 mm. long and 5–6 mm. broad, rounded at apex; stamens numerous, the filaments slender, 5–6 mm. long, the anthers oblong, 2–3 mm. long, rounded at apex, densely villose, the styles 3–4 mm. long. Fruit ovoid or subglobose, about 1.5 cm. long, brown, glabrous.

Western China (Sikang, Szechuan, and northern Yunnan) and north-eastern India (Khasia), in thickets at altitudes of 1000–3650 meters. Flowers buff-yellow, June–July.

CHINA: Szechuan: Without precise locality, *E. H. Wilson* 3275 (A); Kuan Hsien, *W. P. Fang* 2220 (A, NY), 2258 (A, NY); Mao Hsien, *W. P. Fang* 21947 (A), 21958 (A); Wen-ch'üan Hsien, *E. H. Wilson* 888 p. p. (A), 1029 (A, TYPE); "Yang-ching" Hsien, *E. H. Wilson* 891 p. p. (A, GH, US); O-mei-shan, *E. H. Wilson* 4765 (A), *W. P. Fang* 12835 (A), *F. T. Wang* 23348 (A), *H. C. Chow* 8108 (A), 1225 (A), 12310 (A), *L. Y. Tai* 34 (A), *S. C. Sun & K. Chang* 273 (A); Wa-shan, *E. H. Wilson* 888 p. p. (A), 891 p. p. (A); Wa-wu-shan, *E. H. Wilson* 888 p. p. (A); Pao-hsing Hsien, *K. L. Chu* 3269 (A). Sikang: Kan-ting (Tachienlu), *A. E. Pratt* 101 (GH); *E. H. Wilson* 1029 (GH, US), *C. Y. Chiao* 1650 (A), 2046 (A). Yunnan: Without precise locality, *H. T. Tsai* 57375 (A); "Sua-kia," *E. E. Maire* 28 (A); Chienchuan-Mekong divide, *G. Forrest* 21521 (A, US), 22278 (A, US), 22283 (A); Yun-lu-shan, Yangtze-Mekong watershed, *J. F. Rock* 25067 (NY); Shun-ning, *T. T. Yü* 16219 (A); Chung-tien, *K. M. Feng* 1786 (A); Li-chiang, *R. C. Ching* 20462 (A), 21464 (A); Wei-hsi Hsien, *H. T. Tsai* 57998 (A), 59692 (A), *C. W. Wang* 63802 (A), 64031 (A), 64054 (A), 68110 (A); Lan-p'ing, *H. T. Tsai* 53741 (A).

INDIA: Khasia, *J. D. Hooker & T. Thomson* s. n. (GH).

This species is related to *A. callosa* but is distinguished by the broader leaves with a larger number of secondary veins, by numerous, distinctly raised, very prominent, more or less parallel cross-bars, and by the large white pith and the yellow flowers. The specimens cited belong to the typical form of the species, which may be designated as forma *venosa*.

## 25a. *Actinidia venosa* Rehder forma *pubescens* f. nov.

A f. *venosa* foliis subtus pubescentibus differt.

Western China, in eastern Sikang only, at altitudes of 2700–3200 meters.

CHINA: Sikang: Hui-li Hsien, *T. T. Yü* 1451 (A, TYPE); "Yenyuen," Yalung River, *H. Handel-Mazzetti* 5406 (A).

A form characterized by the leaves being more or less densely pubescent below. Only young fruiting specimens are observed. The fruit is brownish.

26. *Actinidia trichogyna* Franch. in Jour. de Bot. 8: 278. 1894; Rehder in Sarg. Pl. Wils. 2: 384. 1915.

*Actinidia callosa* Lindl. var. *trichogyna* Finet & Gagnep. in Bull. Soc. Bot. France 52: Mém. 4: 20. 1906 (Contr. Fl. As. Or.); Dunn in Jour. Linn. Soc. Bot. 39: 406. 1911.

Climbing shrubs to 7 m.; branches dark reddish brown, with oblong pale lenticels, the young branchlets puberulous to tomentose, soon glabrescent; pith large, white lamellate. Leaves thin-chartaceous, ovate to ovate-oblong to elliptic-ovate, about 5.5–8.5 cm. long and 3–5 cm. broad, acute to acuminate at apex, broad-truncate or rounded to subcordate at base, often obliquely so, the margins mucronulate-serrulate, the upper surface dark green, more or less tomentose along the costa and veins, soon glabrous, the lower surface glabrous or slightly puberulous along the costa, glaucous, the costa and veins inconspicuous above, purple and distinct but not raised beneath, the secondary veins about 5 or 6 per side, rarely more, arcuate-ascending, anastomosing, the veinlets finely reticulate, often in parallel cross-bars, inconspicuous above, purple and subconspicuous beneath; petioles 2–3 cm. long, tomentose to glabrate, purple. Inflorescence in axillary cymes of 1–3 flowers, tomentose, the peduncles about 5 mm. long, the pedicels about the same in length. Flowers yellow; sepals 5, ovate, about 4 mm. long and 2.5 mm. broad, acute to obtuse at apex, tomentose to glabrate; petals 5, obovate-oblong, about 8 mm. long and 4 mm. broad, rounded at apex; stamens numerous, the filaments very slender, about 3–4 mm. long, the anthers yellow, oval, about 1 mm. long, rounded at apex, the base not divergent; ovary subglobose, about 2–3 mm. long, densely villose, the styles about 3 mm. long. Fruit subglobose, about 1 cm. across, brown, glabrous.

Western China (western Hupeh and eastern Szechuan to northwestern Yunnan), in scrubs and thickets at altitudes of 2800–3000 meters. Flowers yellow, tinged rose, June.

CHINA: Hupeh: Western Hupeh, *A. Henry* 7135 (GH), *E. H. Wilson* 2204 (A, US). Szechuan: Chen-k'ou Hsien, *Farges* 370 (NY, isotype). Yunnan: Without precise locality, *G. Forrest* 7906 (A), 17781 (A); Chienchuan-Mekong divide, *G. Forrest* 21522 (A, US), *J. F. Rock* 8618 (A, US); Mekong-Yangtze divide, *J. F. Rock* 9403 (A, US), 10373 (A, US); Li-chiang, *R. C. Ching* 20841 (A), 22004 (A); Salwin-Chiuchiang divide, *T. T. Yü* 19248 (A).

This species is in close alliance with *A. pilosula* and *A. venosa*, both with broad-based leaves, tomentose inflorescences, large white piths, and yellow flowers. It can, however, be distinguished particularly by its glaucous leaves. In this character it resembles *A. sabiaefolia*, a species of eastern China, but the latter has smaller, crenate-serrulate

leaves and glabrous sepals. In the glaucous leaves, *A. trichogyna* also resembles *A. melanandra* Franch., of western China, but the latter has purple instead of yellow anthers and also narrower leaf-bases which are not rounded to subcordate.

27. *Actinidia glabra* sp. nov.

Frutex scandens, 6–14 m. altus, omnino glaber; ramis purpureo-nigrescentibus, plus minusve striatis, lenticellis pallidis parvis punctiformibus, medulla ampla brunnea lamellata; foliis subcoriaceis, utrinque glabris, oblongo-ovatis, circiter 6–9 cm. longis et 3–4.5 cm. latis, apice acutis vel acuminatis, interdum obtusis, basi oblique cuneatis vel subrotundatis, margine integris vel apicem versus sparse et minute serrulatis, supra atroviridibus nitidis, subtus glaucescentibus, costa utrinque prominente, nervis lateralibus utrinsecus 6 vel 7, arcuato-adscententibus, prope marginem anastomosantibus, venulis reticulatis utrinque conspicuis; petiolis 1.5–2.2 cm. longis; inflorescentiis ignotis; fructibus plerumque solitarii, axillaribus, ovoideis, circiter 2.5 cm. longis et 2 cm. latis, flavide brunneis, glabris, lenticellis pallide dispersis, seminibus brunneis ovoideis, leviter compressis, circiter 3 mm. longis et 2 mm. crassis, testa in sicco reticulata.

Southern China, in Kwangsi, in thickets. Flowers unknown.

CHINA: Kwangsi: Shih-wan-ta-shan, S. of Nan-ning, *R. C. Ching* 7875 (NY, TYPE); Shang-ssu Hsien, Shih-wan-ta-shan, Teng-lung Village, *W. T. Tsang* 24135 (NY).

Although flowers are not known, this seems to be a distinct species because of its entirely glabrous habit. It is one of the alliance of *A. callosa* Lindl., from which it can be distinguished by the more coriaceous, nearly entire leaves, brown lamellate pith, and smaller, brown fruits.

28. *Actinidia sabiaefolia* Dunn in Jour. Linn. Soc. Bot. **38**: 357. 1908; Chun in Sunyatsenia **4**: 190. 1940.

*Actinidia callosa* Lindl. var. *sabiaefolia* Dunn in op. cit. **39**: 406. 1911.

Climbing shrubs; branches dark reddish, glabrous, sparsely lenticellate, the lenticels short, oval, pale; pith small, brown, lamellate. Leaves chartaceous, ovate, about 5–6 cm. long and 2.5–3 cm. broad, acute to sometimes obtuse at apex, rounded at base, sometimes obliquely so, the margins inconspicuously crenate-mucronulate, glabrous, and very dark above, much paler and more or less glabrous beneath, the costa and veins inconspicuous above, purplish and distinct but not raised beneath, the secondary veins about 5 per side, arcuately ascending, anastomosing, the veinlets reticulate, purple and conspicuous beneath; petioles purplish, about 2 cm. long, glabrous, sometimes more or less glaucous. Inflorescences in axillary cymes of 1–3 flowers, glabrous throughout, the peduncles to 5 mm. long; pedicels to 1 cm. long; bracts minute. Flowers dioecious, white; sepals 5, ovate, 2–3 mm. long, obtuse to rounded at apex, more or less ciliate along the margins; petals 5, obovate, 5–6 mm. long, 3.5–4 mm. broad, rounded at apex; stamens numerous, the fila-



ments slender, about 2 mm. long, the anthers yellow, oval, scarcely 1 mm. long, rounded at apex, not divergent at base; ovary ovoid, about 2 mm. long, densely reddish-tomentose, the styles about 2 mm. long.

Southeastern China (Kwangtung, Kwangsi, and Fukien), in mountain forests. Flowers white.

CHINA: Fukien: Nan-p'ing (Yenping), *Hongkong Herb.* 1120 (A), 2402 (A, ISOTYPE).

This taxon was first described by Dunn as a distinct species, but subsequently he treated it as a variety of *A. callosa*. Chun, who records the plant from Kwangtung and Kwangsi and adds a description of the fruit, is of the opinion that it should be reinstated as a species. It differs from *A. callosa* and its varieties in the consistently smaller, more or less glaucous leaves, and in the smaller flowers. I have seen no specimens other than Dunn's original collections. A larger series of specimens, from Fukien and the neighbouring provinces of Kwangtung and Kwangsi, is desirable for study of the variations in this species and its relationship with *A. callosa* and its many varietes.

**29. *Actinidia callosa* Lindl. Nat. Syst. ed. 2. 439. 1835.**

Climbing shrubs to 7 m.; branches glabrous or the young branchlets tomentose, dark gray to reddish brown, with distinct conspicuous long yellowish lenticels; pith solid, firm, light orange colored, or sometimes slightly and irregularly lamellate in the center. Leaves chartaceous, obovate to ovate-elliptic or sometimes ovate-lanceolate, about 5–13 cm. long and 2.5–6.5 cm. broad, acuminate at apex, rounded to subcuneate at base, usually obliquely so, the margins serrulate or sometimes crenately serrulate or subentire, glabrous or both surfaces tomentose in the nerve-axils or along the veins on the lower surface, dark and more or less shining above, pale beneath, the secondary veins about 5–7 per side, more or less straight or arcuate-ascending, anastomosing, the veins or their branches ending in the marginal teeth, the veinlets reticulate, inconspicuous above, subconspicuous beneath; petioles 2–5.5 cm. long, reddish, glabrous or more or less slightly pubescent. Inflorescences in axillary 1–5-flowered cymes, glabrate or slightly tomentose, the peduncles 2.5–15 mm. long, the pedicels 5–20 mm. long, slender. Flowers white; sepals ovate, about 6 mm. long and 4 mm. broad, obtuse at apex, glabrous or tomentose, the margins sometimes ciliate; petals broadly oblong-obovate, about 10 mm. long and 7 mm. broad, rounded to obtuse at apex; stamens numerous, the filaments slender, 4–6 mm. long, the anthers yellow, oval, about 2 mm. long, obtuse at apex, divergent at base; ovary oblong-ovoid, elliptic, about 3–4 cm. long and 2–2.5 cm. across, glabrous, grayish green, with gray or brown lenticels.

*Actinidia callosa* is a very variable species, covering a wide geographic area from Taiwan to south-central and western China, and to north-eastern India and Malaysia. Besides the typical form, which extends from southern China all the way to Java, there are many other varieties

of more limited geographical ranges that can be recognized. A few other species, such as *A. venosa*, *A. trichogyna*, and *A. sabiaefolia*, were formerly included in *A. callosa* by Dunn in his very broad concept of the species. They possess, however, not only definite and more limited ranges but also several distinct and constant characters, and they are here treated as distinct entities closely associated with *A. callosa*.

## KEY TO THE VARIETIES

- A. Pedicels and calyces glabrous.
  - B. Leaves glabrous throughout, not tomentose in the nerve-axils beneath.
    - .....a. var. *callosa*.
  - BB. Leaves white-tomentose in the nerve-axils on the lower surface, otherwise glabrous. ....b. var. *henryi*.
- AA. Pedicels and calyces tomentose.
  - B. Leaves white-tomentose in the nerve-axils on the lower surface, otherwise glabrous. ....c. var. *formosana*.
  - BB. Leaves tomentose along the costa and nerves on the lower surface.
    - C. Tomentum on leaves rusty-granular, present along veins only. ....d. var. *indochinensis*.
    - CC. Leaves more or less densely villose-pubescent all over the lower surface. ....e. var. *pubescens*.

29a. *Actinidia callosa* var. *callosa*.

*Actinidia callosa* Lindl. Nat. Syst. ed. 2. 439. 1835; Dunn in Jour. Linn. Soc. Bot. **39**: 405. 1911; Lév. Fl. Kouy-Tcheou 413. 1915; Rehder in Sarg. Pl. Wils. **2**: 382. 1915; Koord. Exk. Fl. Java **2**: 602. 1912, Fl. Tjib. **2**: 179. 1923; Baker in Jour. Bot. **62**: Suppl. 9. 1924; Van Steenis in Bull. Bot. Gard. Buitenz. III. **13**: 174. 1934, Fl. Males. I. **4**: 37. 1948.

Leaves chartaceous, obovate to ovate-elliptic, rarely ovate-lanceolate, about 3–13 cm. long and 2.5–6 cm. broad, acuminate at apex, glabrous on both surfaces; pedicels and calyces glabrous.

Southern Asia, from southern China, Indo-China, and northeastern India to Malaysia, in forests and thickets, at altitudes of 300–2400 meters. Flowers white, rarely yellowish, April–May.

CHINA: Anhwei: Hsiu-ning Hsien, R. C. Ching 3321 (A), Wu-yüan Hsien, R. C. Ching 3267 (A). Chekiang: Li-shui Hsien, Y. L. Keng 4235 (A), H. H. Hu 464 (A); Ch'ing-yüan, R. C. Ching 2487 (A). Kiangsi: Lung-nan Hsien, S. K. Lau 4690 (US). Fukien: Ch'ung-an Hsien, H. H. Hu 1336 (A); Ku-shan, H. H. Chung 6706 (A). Hunan: Ch'ang-ning Hsien, Fan & Li 176 (A); I-chang Hsien, W. T. Tsang 23757 (US). Kwangsi: Ling-yun Hsien, Steward & Cheo 97 (NY), 428 (A, NY), 1306 (A); Yung Hsien, Steward & Cheo 906 (A, NY); Kwei-lin Hsien, W. T. Tsang 28494 (US). Yunnan: without precise localities, G. Forrest 12057 (A), 15834 (A), 17939 (A); Mekong-Salwin divide, west of Wei-hsi, J. F. Rock 23278 (A); Shweli-Salwin divide, G. Forrest 24261 (US), 24380 (US); Shun-ning, T. T. Yü 15998 (A), 16150 (A), 16613 (A); Mien-ning, T. T. Yü 17780 (A); south of Red River, A. Henry 10056 (US), 10056A (A, US), 10056B (A, NY); Meng-tzu, A. Henry 10824 (A, NY), 10824A (A, NY); Pi-tsieh Hsien, H. T. Tsai 52784 (A); Fo-hai, C. W. Wang 73984 (A), 77266 (A); P'ing-pien Hsien, H. T. Tsai 62630 (A); Chen hsiung Hsien, H. T. Tsai 52686 (A); Liang-shan

Hsien, *H. T. Tsai* 51342 (A). Kwangtung: Lo-ch'ang, *Y. Tsiang* 1305 (A), 1470 (A), *C. L. Tso* 20489 (NY), 20536 (NY); Chao-chou Hsien, *R. Mell* 383 (A); Tseng-chen Hsien, *W. T. Tsang* 20304 (NY, US); Ta-pu Hsien, *W. T. Tsang* 21150 (A, NY); Wen-yüan Hsien, *S. K. Lau* 2117 (A); Ju-yuan, *S. P. Ko* 52555 (A), 52563 (A).

INDIA: Nepal, *Wallich* 6634 (NY, ISOTYPE); Garhwal, *East India Co.* 305 (GH), *A. E. Osmaston* 822 (A); Sikkim, *J. D. Hooker* s. n. (GH); W. Nepal, Rikbar, Doti district, *Bis Ram* 400 (A); Dehra Dun, *Mulkh Raj Beli* s. n. (A), *T. Hisain* s. n. (A); Pittoragart, E. Almoan, *A. E. Osmaston* 1476 (A).

INDO-CHINA: Tonkin, Chapa, *A. Pételot* 6343 (A), 6344 (A); Laokay, Tonkin, *A. Pételot* 8532 (A).

This typical form of the species covers a wide range and exhibits considerable variation, especially in the shape, size, and margin of leaves. These variations, however, are not constant and they do not seem to be associated with either other morphological characters or geographical ranges. Considering the variable nature of individual plants in this genus, it is not attempted to further divide these forms taxonomically.

**29b. *Actinidia callosa* var. *henryi* Maxim.** in *Acta Hort. Petrop.* **11**: 36. 1890; *Lév. Fl. Kouy-Tcheou* 413. 1915; *Rehder* in *Sarg. Pl. Wils.* **2**: 382. 1915.

*Actinidia curvidens* Dunn in *Kew Bull.* **1906**: 1. 1906; *Hand.-Mazz. Symb. Sin.* **7**: 390. 1931.

*Actinidia callosa* var. *typica* forma C. Dunn in *Jour. Linn. Soc. Bot.* **39**: 409. 1911.

*Actinidia callosa* sensu Diels in *Bot. Jahrb.* **29**: 470. 1900. non Lindl.

*Actinidia venosa* sensu *Hand.-Mazz. Symb. Sin.* **7**: 390. 1931, p. p., non *Rehder*.

Leaves chartaceous, oblong-lanceolate to ovate, about 6–12 cm. long and 3–6.5 cm. broad, acuminate at apex, glabrous on both surfaces except for tufts of white tomentum in the axils of the secondary nerves on the lower surface; pedicels and calyces more or less glabrous.

Southwestern China (western Hupeh, Szechuan, and western Kweichow to southwestern Hunan) in thickets, at altitudes of 1700–3500 meters. Flowers white, May–June.

CHINA: Hupeh: I-chang and vicinity, *A. Henry* 3494 (A, GH, US), 3564 (GH), 3955 (GH, NY, US), 4377 (US) (all four numbers COTYPES of *A. curvidens* Dunn), 4377A (GH), 5797 (A, GH, US), 6494 (GH), *E. H. Wilson* 348 (A, NY, US), 512 (A, GH, US), 2096 (GH), 2204 (NY); Fang Hsien, *E. H. Wilson* 2012 (A, GH, US); Pa-tung Hsien, *H. C. Chow* 240 (A, NY), 836 (A, NY); Chien-shih Hsien, *H. C. Chow* 1633 (A, NY); Küan-yin-t'ang, *W. Y. Chun* 5232 (A); "Suao-ya-tsze," *W. Y. Chun* 3627 (A). Szechuan: Without precise locality, *A. Henry* 7243 (GH); Wa-shan, *E. H. Wilson* 2016 (A, US); Cheng-k'ou Hsien, *R. P. Farges* s. n. (NY); Nan-ch'uan, *Bock & Rosthorn* 1824 (A), *W. P. Fang* 827 (A), 1079 (A), 1105 (A), 1113 (A), 1350 (A); Kuan Hsien, *F. T. Wang* 20812a (A); O-mei-shan, *E. H. Wilson* 4762 (A), *W. P. Fang* 2475 (A), 7667 (A), *Chiao & Fan* 376 (A); Ma-pien Hsien, *F. T. Wang* 23087 (A); O-pien Hsien, *T. T. Yü* 738 (A), 846 (A), *Y. S. Liu* 2083 (A). Kweichow: Kwei-ting, *H. Handel-Mazzetti*



10635 (A); Fan-ching-shan, *Steward, Chiao & Cheo* 587 (A, NY); Tung-tzu, *Y. Tsiang* 5168 (NY); Tu-yun, *Y. Tsiang* 5669 (NY), 5748 (NY), 6075 (NY).

*Actinidia curvidens* Dunn was reduced by Dunn himself to this variety, which was recognized by him as a form of *A. callosa*. This taxon closely resembles the typical variety of the species, but it may be distinguished by the presence of hairs in the nerve-axils on the lower surface of the leaves.

29c. ***Actinidia callosa* var. *formosana*** Finet & Gagnep. in Bull. Soc. Bot. France **52**: Mém. **4**: 20. 1905 (Contr. Fl. As. Or.); Dunn in Jour. Linn. Soc. Bot. **39**: 406. 1911; Hayata, Icon. Pl. Formos. **4**: 2. 1914.

*Actinidia formosana* Hayata, Icon. Pl. Formos. **8**: 12. 1919; Kanehira, Formos. Trees rev. ed. 449, f. 407. 1936.

Leaves chartaceous, oblong-lanceolate to ovate, about 6–14 cm. long and 2.5–6 cm. broad, shortly acuminate at apex, glabrous on both surfaces except for tufts of white tomentum in the axils of the secondary veins on the lower surface; pedicels rusty-tomentose; sepals rusty-tomentose on both surfaces.

China, in Taiwan only, from the central to the northern part of the island, in forests at altitudes of 1160–2000 meters. Flowers, April–May.

CHINA: Taiwan: Tamsui, *Morse* 1388 (A); Taipei, *E. H. Wilson* 10195 (A), 10257 (A), 10258 (A), *T. Tanaka & Y. Shimada* 11010 (NY, US), *S. Sasaki s. n.* (A), *S. Suzuki s. n.* (A); Chiao-pan-shan, *Y. Shimada s. n.* (A); Mt. Arisan, *E. H. Wilson* 10862 (A), 10897 (A); Rengachi, *T. Hayashi* 21221 (A).

This Taiwan plant is very close to the mainland forms. It resembles the variety *henryi* of western China, in having tufts of hairs in the vein-axils on the lower leaf-surface. The leaves are usually strongly bicolored, like those of plants of the typical form of the species from the neighboring provinces of Fukien and Kwangtung.

29d. ***Actinidia callosa* var. *indochinensis*** (Merrill) comb. nov.

*Actinidia indochinensis* Merrill in Jour. Arnold Arb. **19**: 53. 1938.

Young branchlets and inflorescences rusty-granular-tomentose; leaves subchartaceous when young, becoming coriaceous when mature, ovate, 6–10 cm. long, 2.5–6 cm. broad, dark and glabrous above, paler and rusty-granular-tomentose along the costa and veins beneath, the margins subentire to inconspicuously and remotely crenate-serrulate toward the apex.

Southwestern China, in Yunnan, and Indo-China, in Tonkin, in forests at altitudes of 1400–1900 meters. Flowers white, April.

CHINA: Yunnan: Without precise locality, *J. C. Liu & C. Wang* 85443 (A).

INDO-CHINA: Tonkin, Chapa, *A. Pételot s. n.* (A), 4406 (US), 5938 (A, TYPE), 5940 (A); Tonkin, Lao-kay, *E. Poilane* 17004 (A), 21688 (A).

This variety is distinguished by the granular indumentum on the young branchlets, inflorescences, and along the costa and veins of the lower leaf-surface.

- 29e. **Actinidia callosa** var. **pubescens** Dunn in Jour. Linn. Soc. Bot. **39**: 406. 1911; Van Steenis, Fl. Males. I. **4**: 39. 1948.

*Saurauia tomentosa* Korth. ex Koord. & Val. Bidjr. **3**: 280. 1896, *nomen*.

*Actinidia pubescens* Ridley in Jour. Fed. Mal. Stat. Mus. **8**(4): 18. 1917.

Leaves chartaceous, ovate, about 6.5–12 cm. long and 4–8 cm. broad, acute at apex, rounded to truncate at base, thinly tomentose all over the lower surface; pedicels and calyces rusty-tomentose.

Southwestern China (Yunnan) and Assam to Malaysia (Malay Peninsula, Sumatra, Java?), in forests at altitudes of 2000–2500 meters.

CHINA: Yunnan: Mekong-Salwin divide, "Alulaka," *T. T. Yü* 19107 (A); Salwin valley, "Sekai," *T. T. Yü* 23001 (A); near "Bahan," *H. Handel-Mazzetti* 9042 (A); Meng-tzu, *A. Henry* 10780 (A, NY, US); without precise locality, *G. Forrest* 18017 (A).

This variety is distinct in its broader leaves, which are conspicuously and evenly white-tomentose throughout the lower leaf-surface. I have not seen specimens from India and Malaysia. This variety may prove to merit specific recognition.

*Forrest* 13910, identified by W. W. Smith as *A. championii* var. *mollis* Dunn, actually belongs here. Handel-Mazzetti (*Symb. Sin.* **7**: 390, 391. 1931) refers this plant, as well as his own 9042 and 9046, to *A. pilosula* (Finet & Gagnep.) Stapf, a new combination based on *A. callosa* Lindl. var. *pilosula* Finet & Gagnep., with "*A. championii* var. *mollis* W. W. Smith in Not. R. Bot. Gard. Edinbgh., XVII., 305 (1930), non Dunn," given in the synonymy. Handel-Mazzetti's 9042 is available, and this is clearly the same plant as Smith's and should also be referred here. *Actinidia pilosula* Stapf, based on *A. callosa* Lindl. var. *pilosula* Finet & Gagnep. should be typified by the latter, and it is here considered as a species distinct from *A. callosa*.

30. **Actinidia latifolia** (Gardn. & Champ.) Merr. in Jour. Roy. As. Soc. Strait. Br. **86**: 330. 1922.

Climbing shrubs to 7 m. high; branches reddish brown, with pale oblong to lanceolate lenticels, rusty-tomentose on young branchlets; pith solid, whitish, firm, becoming hollow in the center when old. Leaves chartaceous, broadly ovate or obovate or suborbicular to oblong-ovate or oblong-obovate, about 5.5–11 cm. long and 3–9 cm. broad, acute to acuminate at apex, cuneate, rounded, or truncate to reniform-cordate at base, the margins subentire with remote minute callose teeth, the upper surface green, glabrate, puberulous or densely puberulous, the lower surface pale, covered sparsely or densely by a pale appressed stellate-tomentum, the costa and veins inconspicuous to subconspicuous above, distinct and elevated beneath, the secondary veins about 6 or 7 per side, slightly arcuate-ascending, anastomosing, the veinlets with many dis-

tinct cross-bars below, the reticulations hidden by the indumentum or not; petioles 2–4 cm. long, tomentose. Inflorescences in axillary or lateral, many-flowered, 3 or 4-branched cymes, to 10 cm. long, densely rusty-stellate-tomentose; peduncles 1.5–8 cm. long, forked at top; pedicels 0.5–1.5 cm. long, elongating and enlarging in fruit; bracts minute, linear. Flowers brownish yellow; sepals 5, ovate, about 4–5 mm. long and 3–4 mm. broad, acute to obtuse, tomentose without; petals 5, about 6–8 cm. long and 3–4 mm. wide, obtuse to rounded, pubescent without; stamens numerous, the filaments slender, 2–3 or sometimes to 5 mm. long, the anthers linear-oblong, about 1–2 mm. long, the connective projected and pointed at top, the base not divergent; ovary globose, about 2 mm. long, densely pilose, the styles 2–3 mm. long, slender. Fruit subglobose to ovoid, about 3–4 cm. long and 2–3 cm. across, brown, lenticellate, glabrous when mature or pubescent at the base and top only.

A distinct species readily recognized by the more or less characteristic leaves and inflorescences. The leaves are generally broadly ovate, with dense stellate tomentum beneath. The leaf-bases vary considerably in shape. The inflorescence is much more elaborate than any other species of the genus; it is large, generally long-peduncled, much-branched, and bearing many flowers. There is some variation in the size of the inflorescence. In spite of its wide range and variations in leaf-shape and size of inflorescence, *A. latifolia* is a relatively uniform species. In addition to the typical form, two varieties, apparently both of local and rare occurrence, may be recognized.

#### KEY TO THE VARIETIES

- A. Tomentum dense, closed on the lower leaf-surface, the reticulations of veinlets obscure.
  - B. Upper surface of leaves very sparsely puberulous or glabrate; lower surface densely stellate-tomentose. . . . . a. var. *latifolia*.
  - BB. Upper surface of leaves densely puberulous; lower surface more thickly stellate-tomentose. . . . . b. var. *mollis*.
- AA. Tomentum thin, open on the lower leaf-surface, the reticulations of veinlets distinct. . . . . c. var. *indochinensis*.

#### 30a. *Actinidia latifolia* var. *latifolia*.

*Actinidia latifolia* (Gardn. & Champ.) Merr. in Jour. Roy. As. Soc. Strait. Br. **86**: 330. 1922; Nakai in Bot. Mag. Tokyo **41**: 521. 1927; Sasaki in Trans. Nat. Hist. Soc. Formosa **19**: 480. 1929; Hand.-Mazz. Symb. Sin. **7**: 391. 1931; Kanehira, Formosan Trees rev. ed. 450. 1936; Van Steenis, Fl. Males. I. **4**: 39, f. 1. 1948.

*Heptaca* ? *latifolia* Gardn. & Champ. in Hook. Jour. Bot. Kew Gard. Misc. **1**: 243. 1849.

*Kadsura pubescens* Miq. Fl. Ind. Bat. Suppl. 620. 1862; Kurz in Jour. As. Soc. Beng. **45**(2): 119. 1876.

*Actinidia championi* Benth. Fl. Hongk. 26. 1861; Matsum. & Hayata in Jour. Coll. Sci. Univ. Tokyo **22**: 47. 1906 (Enum. Pl. Formos.); Finet & Gagnep. in Lecomte, Fl. Gén. Indo-Chine **1**: 28. 1907; Hayata in Jour. Coll. Sci. Univ. Tokyo **30**(1): 44. 1911 (Mat. Fl. Formos.), Icon. Pl.



Formos. 1: 88. 1911; Dunn in Jour. Linn. Soc. Bot. 39: 407. 1911; Ridl. Fl. Mal. Pen. 1: 206. 1922.

*Actinidia miquelii* King in Jour. As. Soc. Beng. 59(2): 196. 1896, *nomen*, in Ann. Roy. Bot. Gard. Calcutta 5: 145, t. 176. 1896.

*Actinidia gnaphalocarpa* Hayata, Icon. Pl. Formos. 9: 97. 1920.

Leaves broadly ovate to obovate or sub-orbicular, about 5.5–11 cm. long and 3–9 cm. wide, acuminate at apex, cuneate or rounded to reniform-cordate at base, the upper surface glabrate or puberulous, the lower surface covered by a pale appressed stellate tomentum obliterating the veinlet-reticulations.

Southeastern and southern China (Taiwan, Kwangtung, Kwangsi, Hunan, Fukien, Chekiang), Indo-China, Siam, and Malaysia (Perak, Jehore, Sumatra), in thickets at altitudes of 350–1500 meters. Flowers brownish yellow, April.

MALAY PENINSULA: Perak, No. coll. 5232 (A); Penang, Singapore Bot. Gard. 32620 (A); Kedah, Singapore Bot. Gard. 35014 (A).

INDO-CHINA: Without precise locality, *M. Poilane* 8060 (A). Tonkin: Laokay, A. Pételot 8649 (A); Chapa, A. Pételot 8747 (A); Laos: Bassae, *M. Poilane* 15877 (A). Annam: Dong-cho, Auang-tri, *M. Poilane* 10713 (A).

CHINA: Taiwan: Bankinsing, A. Henry 825 (A); Horisha, Nanto, E. H. Wilson 11173 (A, US); Rengachi, T. Hayashi 21244 (A). Chekiang: Ch'ung-an Hsien, Y. L. Keng 654 (A). Fukien: Ku-shan, J. B. Norton 1365 (US), 1366 (US), H. H. Chung 7202 (A, NY); Ku-t'ien Hsien, H. H. Chung 4019 (A). Kiangsi: P'ing-hsiang Hsien, Wang-Te-Hui 205 (A); Huang-shu-lin, between Ning-tu and Ch'ang-t'ling, Wang-Te-Hui 370 (A); Yung-hsin Hsien, H. H. Hu 803 (A); Ting-nan Hsien, H. H. Hu 1077 (A); "Hong San," G. L. Gressitt 1453 (A); Lung-nan Hsien, S. K. Lau 444 (A, US); Ch'ien-nan Hsien, S. K. Lau 3987 (A, US). Kweichow: Sanhao, Y. Tsiang 6403 (NY). Kwangsi: N. Lo-chen, R. C. Ching 5709 (NY), 6003 (NY); W. Pai-se, R. C. Ching 7378 (NY); S. Nan-ning, Shih-wan-tai-shan, R. C. Ching 8178 (NY), 8438 (NY); Shang-ssu Hsien, Shih-wan-tai-shan, W. T. Tsang 22225 (A), 24543 (NY); Ch'üan Hsien, W. T. Tsang 27694 (US); Kuei-lin, W. T. Tsang 28284 (US). Hongkong: C. Wright s. n. (GH, US, ISOTYPES), Ford, s. n. (A, NY, US), Hongkong Herb. 8017 (A); Herb. Kew 53 (GH, ISOTYPE of *A. championi* Benth.). Kwangtung: "Lung-tau Shan," Canton Christ. Coll. 12120 (US); Ta-pu Hsien, W. T. Tsang 21074 (A, NY), 21715 (A, NY); Ying-te Hsien, T. M. Tsui 565 (NY, US); Lo-ch'ang Hsien, W. T. Tsang 20843 (NY), C. L. Tso 20965 (NY). Hainan: Hainan, C. Wang 33505 (NY); Ling-men, J. L. Gressitt 1164 (A); Lien-hua-lin, F. A. McClure 8061 (A); Wu-chih-shan (Five Finger Mt.) F. A. McClure 9487 (NY); Pao-ting Hsien, F. C. How 71995 (A), 72701 (A); Yai Hsien (Yaichow), H. Y. Liang 62264 (A, NY, US), 62597 (NY); Hung-mao-shan, Tsang & Fung 291 (A); "Dung-ka," N. K. Chun & C. L. Tso 43328 (A, NY), 43496 (A, NY, US); Ling-shui Hsien, H. Fung 20096 (A, NY, US); Lin-kao Hsien, W. T. Tsang 239 (A, US), 470 (A, NY, US), 723 (A, US); Ch'eng-mai Hsien, C. I. Lei 619 (NY, US), 907 (NY, US).

The reduction of *A. miquelii* King was first made by Dunn, who listed *Heptaca* ? *latifolia* Gardn. & Champ. in the synonymy of *A. championi*

Benth. This earlier name was subsequently adopted by Merrill. A photograph of the type specimen, *Champion* s. n., from Hongkong, is in the herbarium of the Arnold Arboretum. The reduction of *A. gnaphalocarpa* Hayata was made by Sasaki and followed by Kanehira and others. A photograph of Hayata's type (in A, US) and collections of Taiwan plants indicate that this reduction is necessary.

30b. **Actinidia latifolia** var. **mollis** (Dunn) Hand.-Mazz. Symb. Sin. **7**: 391. 1931.

*Actinidia championi* Benth. var. *mollis* Dunn in Jour. Linn. Soc. Bot. **39**: 407. 1911.

Leaves ovate to oblong-ovate or oblong-obovate, about 10–12 cm. long and 5.5–7 cm. wide, acute to acuminate at apex, broadly acute to rounded or truncate at base, the upper surface more or less densely puberulous, the lower surface very densely and thickly stellate-tomentose, the tomentum obliterating the veinlet-reticulations.

Southwestern China (in southern Yunnan only), in mountain forests at altitudes of 1400–1500 meters. Flowers yellow, June.

CHINA: Yunnan: No precise locality, J. C. Liu & C. Wang 83077 (A); Ssu-mao Hsien, A. Henry 12041 (A, NY, ISOTYPES); P'ing-pien Hsien, H. T. Tsai 55411 (A), 60153 (A), 60193 (A), 60310 (A), 61405 (A), 62271 (A).

30c. **Actinidia latifolia** var. **indochinensis** (Li) comb. nov.

*Actinidia indochinensis* Li in Jour. Arnold Arb. **24**: 366. 1943.

Leaves ovate to elliptic-ovate, 7–21.5 cm. long, 4.5–6.8 cm. wide, acute to shortly acuminate at apex, acute to broadly acutish at base, the upper surface glabrous, the lower surface scattered stellate-tomentose, the veinlet-reticulations distinct.

Indo-China, in Tonkin only. Flowers May–June.

INDO-CHINA: Tonkin: Dam-ha, W. T. Tsang 29907 (A, TYPE).

31. **Actinidia eriantha** Benth. in Jour. Linn. Soc. Bot. **5**: 55. 1861; Dunn in Jour. Linn. Soc. Bot. **39**: 408. 1911; Chun in Sunyatsenia **1**: 271, pl. 37. 1934; Rehder in Jour. Arnold Arb. **18**: 222. 1937.

*Actinidia davidii* Franch. in Nouv. Arch. Mus. Paris sér. 2. **5**: 57. 1884; Dunn in loc. cit. **39**: 408. 1911; Hand.-Mazz. Symb. Sin. **7**: 391. 1931; Chun in op. cit. **2**: 63. 1934.

*Actinidia lanata* Hemsl. in Ann. Bot. **9**: 146. 1895; Dunn in op. cit. **38**: 355. 1908, **39**: 409. 1911; Dunn & Tutcher in Kew Bull. Add. Ser. **10**: 44. 1912; Rehder in Jour. Arnold Arb. **15**: 97. 1934.

Climbing shrubs to 10 m.; branches grayish to dark grayish, glabrate or tomentose, with conspicuous oblong concolored lenticels, the young branches densely white-villose; pith white, medium-sized, lamellate. Leaves chartaceous, broadly ovate to ovate or oblong-ovate, about 8–16 cm. long and 5.5–11 cm. broad, obtuse to acute or shortly acuminate at apex, rounded, truncate to subcordate at base, the margins subentire and with minute scattered callose teeth or minutely mucronulate-serru-

late, green and hispid-puberulous above to nearly glabrous, usually pilose along the costa, pale and densely white-stellate-tomentose beneath, the costa and veins subconspicuous to inconspicuous above, raised and distinct beneath, the secondary veins about 7 or 8 per side, arcuate-ascending, anastomosing, the reticulations with many cross-bars, raised and distinct beneath; petioles short, stout, 1.5–2.5 cm. long, densely and thickly white-villose. Inflorescences in short axillary cymes of 1–4 flowers, densely and thickly white-villose; peduncles scarcely to 1.5 cm. long; pedicels very short, 3–5 mm. long. Flowers large, rose pink; sepals broadly ovate, about 7 mm. long and 5 mm. broad, obtuse, densely villose without; petals 5, ovate, about 1.5 cm. long and 1.1 cm. broad, rounded, the margins often slightly fringed; stamens very numerous, the filaments slender, subequal, 5–7 mm. long, the anthers yellow, oblong, about 1 mm. long, pointed at tip, rounded at base; ovary globose, densely villose, the styles 3–4 mm. long. Fruit ovoid, about 3.5 cm. long and 3 cm. across, densely and thickly pale villose.

Southeastern China (Chekiang, Kiangsi, southern Hunan, Kweichow, Fukien, Kwangsi, Kwangtung), in thickets, at altitudes of 250–1000 meters. Flowers white or pinkish, June.

CHINA: Chekiang: Yung-chia Hsien (Wenchow), *R. C. Ching* 1872 (A, US), *Y. Tsiang* 1401 (A); Lung-ch'üan Hsien, *R. C. Ching* 2479 (A, US), *H. H. Hu* 463 (A). Hunan: Ch'ang-ning Hsien, *C. S. Fan & Y. Y. Li* 212 (A). Kweichow: Kuei-ting, *Y. Tsiang* 5483 (NY). Fukien: "Shiu-kia," *Hongkong Herb.* 2397 (A); Nan-p'ing (Yenping), *H. H. Chung* 3283 (A), 3365 (A), *Chou Kuang Hou* 8979 (A); Ku-shan, *J. B. Norton* 136 (US), *H. H. Chung* 6641 (A). Kwangsi: N. Lo-chen, *R. C. Ching* 6132 (A, US); Kwei-lin Hsien, *W. T. Tsang* 28428 (US). Kwangtung: Lien-p'ing Hsien, *R. Mell* 604 (A); Lo-ch'ang Hsien, *C. L. Tso* 20538 (A, NY), 20927 (NY); Chia-ying Hsien (Mei), *W. T. Tsang* 21384 (A, NY); Yuan Hsien, *S. K. Lau* 2272 (A); "Lung-tau Mt.," *Canton Christ Coll.* 12297 (NY, US).

Dunn recognized *A. eriantha* Benth., *A. davidii* Franch., and *A. lanata* Hemsl. as three distinct species. He apparently did not see Bentham's or Franchet's types. He misinterpreted *A. davidii* as a species without stellate tomentum, and accordingly this species was misplaced in his key. Bentham's species is based on "*Lindley*, from S. China" and Franchet's on a collection made by David, from "Kiang-si oriental. Automne 1873." A photograph of *Lindley* 1836 is reproduced in *Sun-yatsenia* 1: 273, t. 37. 1934, by Chun, who considers *A. eriantha* Benth. and *A. lanata* Hemsl. as distinct species. He says that *A. eriantha* "is easily distinguished from *A. lanata* Hemsl. by the densely whitish woolly indumentum on the under surface of the leaves, inflorescences, and fruit, and by the filiform, not linear, filaments of the stamens." He considers *A. lanata* as having a fulvous or tawny indumentum.

Rehder, however, in *Jour. Arnold Arb.* 18: 222. 1937, states that none of the distinguishing characters given by Chun and others seem to be dependable and considers the two names to be actually synonymous. I am tentatively following Rehder's opinion. Hemsley's type is from



"China: Kwangtung along the Northwest river, Mr. Ford's native collector; 228 of 1890 collection." This is a young fruiting specimens, which I have not seen. Hemsley describes the indumentum as "ferugineo-lanatis vel tomentosis," and compares it with *A. fulvicoma* Hance. It is possible that his species is referable to the latter, conceivably to var. *hirsuta*.

From the original description, it seems certain that *A. davidii* Franch. also belongs to *A. eriantha* Benth., as noted earlier by Handel-Mazzetti (Symb. Sin. 7: 391. 1931) and others.

32. ***Actinidia chinensis*** Planchon in London Jour. Bot. 6: 303. 1847.

Climbing shrubs to 8 m.; branches reddish brown, with paler oblong lenticels, the young branchlets brownish-pubescent or setose; pith large, lamellate, whitish or yellowish. Leaves thin- or thick-chartaceous, those of the sterile branches broadly ovate to elliptic, very shortly acuminate to cuspidate at apex, those of flowering branches suborbicular, shortly cuspidate, rounded or truncate at apex, rounded to more or less cordate at base, 6–17 cm. long, 6–15 cm. broad, the margins minutely denticulate, the teeth produced by tips of veinlets, the upper surface dark green, more or less puberulous, more densely so on the costa and nerves, or densely scabrid-hispid throughout, the lower surface very pale, densely whitish-stellate-tomentose, the costa and veins subconspicuous above, raised and distinct beneath, the secondary nerves about 5–8 per side, strongly patent, straight or arcuate-ascending, anastomosing, the branchlets ending in the marginal teeth, the veinlets in parallel cross-bars, more or less conspicuous; petioles 3.5–7.5 cm. long, more or less densely pubescent. Inflorescences in few-flowered cymes, from axils of fallen leaves, pubescent; peduncles about 1.5 cm. long; pedicels 1–2 cm. long; bracts minute, linear. Flowers orange-yellow, the staminate slightly smaller; sepals 5, sometimes 3 or 4, ovate-oblong, about 8–10 mm. long and 6–8 mm. wide, obtuse to acute at apex, brownish-tomentose without; petals 5, broadly obovate, shortly clawed, rounded at top, about 1.4–1.5 cm. long, 1–1.2 cm. broad; stamens very numerous, the filaments filiform, unequal, about 5–10 mm. long, the anthers oblong, 1.5 mm. long, acute to obtuse at apex, slightly sagittate at base; ovary subglobose, about 6–7 mm. across, densely brownish-villose, the styles linear, about 5–6 mm. long. Fruit subglobose to ellipsoid, about 3 cm. across, densely brownish-hirsute all over; seeds oblong-ellipsoid, 2–3 mm. long, foveolate-reticulate.

This is the common *Yang-tao* of China, widespread in most parts of the country but especially common along the Yangtze valley. The leaves vary from emarginate to truncate to those on young shoots sometimes shortly acutish or cuspidate. The plants from the island of Taiwan have the leaves relatively longer and much narrower, always acute to shortly acuminate, and also relatively thinner when compared with mainland

plants. The upper surfaces of the leaves are more or less densely long hispid-setose. This insular form, only sterile material being available, is herein recognized as a variety.

#### KEY TO THE VARIETIES

- A. Leaves thicker, generally orbicular, truncate to emarginate at apex, hispid mostly along the veins only; stems and petioles soft-pubescent when young, glabrous when mature. (Mainland China)..... a. var. *chinensis*.  
 AA. Leaves thinner, generally ovate, acute to shortly acuminate at apex, scabrid-hispid above; stems and petioles densely hispid-setose. (Taiwan).  
 ..... b. var. *setosa*.

#### 32a. *Actinidia chinensis* var. *chinensis*.

*Actinidia chinensis* Planchon in London Jour. Bot. **6**: 303. 1837; Oliv. in Hook. Icon. Pl. **15**: t. 1593. 1887; Dunn in Jour. Linn. Soc. Bot. **39**: 408. 1911; Sprague in Bot. Mag. **140**: t. 8538. 1914; Rehder in Sarg. Pl. Wils. **2**: 385. 1915; Merr. & Chun in Sunyatsenia **1**: 70. 1930; Hand.-Mazz. Symb. Sin. **7**: 391. 1931.

Young branchlets and petioles setose, brownish-pubescent; leaves chartaceous, mostly suborbicular, about 6–12 cm. long and broad, emarginate to shortly cuspidate at apex, rounded to more or less cordate at base, the upper surface more or less puberulous, more densely so on the costa and nerves, the lower surface densely whitish-stellate-tomentose.

Widely distributed in western, central, eastern, and southern China, in thickets and forests, on slopes or in ravines, at altitudes of 200–2300 meters. Flowers whitish, changing to buff yellow.

CHINA: Shensi: Tai-pei-shan, W. Purdom 657 (A, US). Honan: Yung-ning, J. Hers 422 (A), 464 (A); Chi-kung-shan, A. N. Steward 9772 (A, US). Kiangsu: I-hsing Hsien, Ching & Tso 523 (A). Anhwei: Chiu-hua-shan, R. C. Ching 2639 (A, US), 2678 (A); Huang-shan, R. C. Ching 2910 (A), W. C. Cheng 3977 (US). Hupeh: Western Hupeh, A. Henry 1166 (US), 2076 (GH), 5834 (GH, US), 5834A (GH, NY), 5834B (US), E. H. Wilson 185 (A, NY, US), 720 (NY); I-ch'ang, E. H. Wilson 347 p. p. (A); Ch'ang-yang Hsien, E. H. Wilson 993 (A, NY, US); "Lantan," P. C. Sylvestri 1467 (A); "Zan-lan-scan," P. C. Sylvestri 6157 (A); Wu-tu-ho, W. Y. Chun 3638 (A), 3980 (A, US); Pa-tung Hsien, H. C. Chow 289 (A, NY), 750 (A, NY). Szechuan: S. Wu-shan, A. Henry s. n. (A); Wen-ch'üan Hsien, E. H. Wilson 347 p. p. (A, GH); Mo-tien-ling, F. T. Wang 22445 (A); Nan-ch'üan Hsien, C. Bock & K. A. v. Rosthorn 1997 (A), W. P. Fang 1084 (A), 1096 (A); O-mei-shan, W. P. Fang 2613 (A), C. L. Sun 2042 (A), 2094 (A), 2136 (A), T. C. Lee 2746 (A), 2990 (A), H. C. Chow 7800 (A), Sun & Chang 784 (A); Ma-pien Hsien, F. T. Wang 22859 (A); O-pien Hsien, Y. S. Liu 1355 (A). Sikang: K'ang-ting, W. C. Cheng 1728 (NY, US), 1729 (A); Ning-yüan Hsien, C. Schneider 993 (A), Tien-ch'üan Hsien, T. C. Tai 5135 (A). Chekiang: Mo-kan-shan, Cheo & Wilson 12709 (GH, NY), F. N. Meyer 1568 (A); Ch'ang-hua Hsien, F. N. Meyer 1537 (A); T'ien-mu Shan, R. C. Ching 5090 (A); S. Yin Hsien (Ningpo),

*D. Macgregor* s. n. (A); T'ien-t'ai Shan, *R. C. Ching* 1438 (A, US); Lung-ch'üan Hsien, *H. H. Hu* 480 (A); Ch'ing-yüan, *Y. L. Keng* 360 (A). Kiangsi: Lu-shan, *T. L. Bullock* 120D (US), *A. N. Steward* 2646 (A, US), *H. H. Chung & C. S. Sun* 664 (A, NY); I-huang, *Y. Tsiang* 10085 (NY); Ch'ien-shan Hsien, *C. S. Fan & Y. Y. Li* 92 (A). Hunan: Hsing-hua Hsien, *H. Handel-Mazzetti* 548 (A); Heng-shan, *H. Handel-Mazzetti* 729 (A). Kweichow: Fan-ching-shan, *Steward, Chiao & Cheo* 430 (A, NY, US); T'ung-tzu Hsien, *Y. Tsiang* 5178 (NY); Tu-yün Hsien, *Y. Tsiang* 5730 (NY); Ta-ting Hsien, *Y. Tsiang* 8949 (NY). Yunnan: Yung-shan Hsien, *H. T. Tsai* 51180 (A). Kwangtung: Lo-ch'ang Hsien, *C. L. Tso* 20704 (NY).

**32b. *Actinidia chinensis* var. *setosa* var. nov.**

*Actinidia chinensis* sensu Nemoto, Fl. Jap. Suppl. 474. 1936; Suzuki in Masamune, Short Fl. Formos. 137. 1936; Kanehira, Formosan Trees. rev. ed. 449, t. 406. 1936; non Planch.

A typo speciei caulibus petiolisque dense ferrugineis hispido-setosis differt; foliis tenuibus, late ovatis, 12–17 cm. longis, 10–15 cm. latis, apice acutis vel breviter acuminatis, superne plus minusve dense scabride hispidulis, inferne stellato-tomentosis.

China, in Taiwan only, at altitudes of 1300–2600 meters.

CHINA: Taiwan: Mt Arisan, *E. H. Wilson* 10802 (US, TYPE; A, ISO-TYPE), Oct. 18, 1918, *R. Kanehira* 2994 (NY).

**33. *Actinidia fulvicoma* Hance in Jour. Bot. 23: 321. 1885.**

Climbing shrubs to 10 m.; branches reddish brown to grayish, with inconspicuous lenticels, the young branchlets densely brownish-tomentose, the older branches glabrous or nearly so; pith whitish, lamellate. Leaves membranaceous or chartaceous to coriaceous, ovate to oblong to oblong-ovate, about 7–15 cm. long, 3–9 cm. broad, acuminate to long-acuminate at apex, rounded to cordate at base, the margins setose-denticulate, the upper surface green, densely to sparsely hirsute to scabrid-hirsute especially along the costa, the lower surface very pale densely yellowish stellate-tomentose, the costa and veins subconspicuous above, raised and distinct beneath, the secondary veins about 8 per side, patent-ascending, anastomosing, the veinlets reticulate, with numerous cross-bars, obliterated by the indumentum beneath; petioles 1.5–4 cm. long, brownish-tomentose. Inflorescences in short few-flowered axillary cymes or the flowers solitary, densely brownish villose-pubescent; peduncles to 1 cm. long; pedicels 1 cm. or less long; bracts minute, linear. Flowers white; sepals 5, ovate, about 6–7 mm. long and 3–4 mm. broad, acute at apex, densely villose without; petals 5, obovate, 7–10 mm. long, 5–7 mm. wide; stamens numerous, the filaments about 3–4 mm. long, the anthers yellow, triangular-ovoid, about 1 mm. long, the apex acute, the base sagittate; ovary subglobose, about 3 mm. across, densely villose, the styles about 3 mm. long. Fruit oblong, to 2.7 cm. long and 2 cm. across, brown, with pale scattered lenticels, glabrous or sparsely pubescent when mature, the persistent calyx erect, not reflexed.



*Actinidia fulvicoma* Hance is a close relative of *A. eriantha* Benth. and has the same general range in southeastern China. It can, however, be readily distinguished from the latter by its relatively narrower and longer leaves which are pubescent above, its more hirsute stems and petioles, its yellowish or brownish indumentum, and its nearly glabrous mature fruit. In *A. eriantha* the young stems and petioles are softly and shortly downy, the indumentum is whitish, and the mature fruit is densely hairy.

The species is composed of three varieties which have more or less distinct but contiguous ranges. The typical variety is found in Chekiang, southern Kiangsi, southwestern Hunan, eastern Kweichow, and northern Kwangtung. Variety *pachyphylla* is found only in Kwangtung, and var. *hirsuta* in Kweichow.

#### KEY TO THE VARIETIES

- A. Leaves chartaceous to thinly coriaceous; stems soft-brownish-hairy..... a. var. *fulvicoma*.  
 AA. Leaves coriaceous; stems with short brownish hirsute hairs..... b. var. *pachyphylla*.  
 AAA. Leaves more or less membranaceous; stems densely long brownish hirsute..... c. var. *hirsuta*.

#### 33a. *Actinidia fulvicoma* var. *fulvicoma*.

*Actinidia fulvicoma* Hance in Jour. Bot. **23**: 321. 1885; Dunn in Jour. Linn. Soc. Bot. **39**: 409. 1911; Hand.-Mazz. Symb. Sin. **7**: 391. 1931.

Young branchlets and petioles soft-brownish-tomentose; leaves chartaceous to thinly coriaceous, ovate to oblong-ovate, about 7–14 cm. long and 3.5–7 cm. broad, long-acuminate at apex, rounded to cordate at base, the margins setose-denticulate, the upper surface hirsute to scabrid-hirsute especially along the costa, the lower surface yellowish stellate-tomentose.

Southeastern to southern China (Chekiang, southern Kiangsi, southern Hunan, Kwangsi, Kwangtung), on slopes or in valleys, in shade or open, at altitudes of 500–800 meters. Flowers white, June.

CHINA: Chekiang: Without precise locality, *Barchet* 65 (US). Kiangsi: Ch'ung-i Hsien, *H. H. Hu* 931 (A); Ta-yü Hsien, *H. H. Hu* 952 (A); Ch'ien-nan Hsien, *S. K. Lau* 4050 (US). Hunan: Sing-ning Hsien, *C. S. Fan & Y. Y. Li* 680 (A); Heng-shan, *H. Handel-Mazzetti* 12182 (A). Kweichow: San-ho Hsien, *Y. Tsiang* 6380 (NY). Kwangsi: Hsing-yeh Hsien, *R. C. Ching* 6880 (NY), 7177 (NY); Lo-chen, Hsien, *R. C. Ching* 5583 (NY), 5678 (NY), 6152 (NY). Kwangtung: Lo-ch'ang Hsien, *C. L. Tso* 20841 (N.Y.).

#### 33b. *Actinidia fulvicoma* var. *pachyphylla* (Dunn) comb. nov.

*Actinidia pachyphylla* Dunn in Jour. Linn. Soc. Bot. **39**: 409. 1911.

Young branchlets and petioles brownish short-hirsute; leaves chartaceous to coriaceous, oblong to oblong-ovate, about 10–15 cm. long and 3–7 cm. broad, acuminate at apex, rounded to cordate at base, the

margins setose-denticulate, the upper surface hirsute to scabrid-hirsute especially along the costa, the lower surface stellate-tomentose.

Southern China, in Kwangtung, in thickets at altitudes of 500–1000 meters. Flowers white, May–June.

CHINA: Kwangtung: Lo-ch'ang Hsien, *C. L. Tso* 20713 (NY), *W. T. Tsang* 20987 (NY); Lien-p'ing, *R. Mell* 603 (A); Yang-shan Hsien, *T. M. Tsui* 748 (NY); Pei-shan to Tai-ping, *W. Y. Chun* 5662 (A); Lung-men Hsien, *W. T. Tsang* 20519 (NY, US).

The type of *A. pachphylla* Dunn, "Swatow, Fung Wan Shan of Phoenix Mountain, *Hong Kong Herb.*", has not been seen. Dunn's species can be distinguished from *A. fulvicoma* only in the thicker leaves. The above cited specimens seem to be referable to this concept, which I recognized as a variety of *A. fulvicoma*. The leaves are generally larger and narrower, varying from chartaceous to thickly coriaceous, sometimes even in a single collection. The thickness of the leaves may be influenced to a certain degree by variations in habitat.

**33c. *Actinidia fulvicoma* var. *hirsuta*** Finet & Gagnep. in Bull. Soc. Bot. France **52**: Mem. **4**: 18. 1907 (Contr. Fl. As. Or.); Hand.-Mazz. Symb. Sin. **7**: 391. 1931.

Young stems and petioles densely brownish long-hirsute; leaves membranaceous to thinly chartaceous, ovate to oblong-ovate, about 7–14 cm. long and 4–9 cm. broad, long-acuminate at apex, rounded to cordate at base, the margins setose-denticulate, the upper surface densely setose, the lower surface densely stellate-tomentose.

Southwestern China, in Kweichow and western Kwangsi, at altitudes of 500–1000 meters. Flower white, June–July.

CHINA: Kweichow: *R. P. Bodinier* 2427 (NY, ISOTYPE); Kuei-ting, *Y. Tsiang* 5586 (NY). *H. Handel-Mazzetti* 10571 (A); Tu-yun Hsien, *Y. Tsiang* 5727 (NY). Kwangsi: Ling-yün Hsien, *A. N. Steward & C. C. Cheo* 656 (A, NY).

Dunn, who examined *Bodinier* 2427, the type, did not recognize this variety, as he considered the specimen "apparently from secondary flowering branch and does not differ from corresponding parts of Hance's type." Handel-Mazzetti, however, reinstated the variety. From the above cited specimens, it seems that in Kweichow and western Kwangsi the species has thinner and more setose leaves, as well as more densely hirsute stems and petioles, indicating the existence of a geographical variety.

**34. *Actinidia lanceolata*** Dunn in Jour. Linn. Soc. Bot. **38**: 356. 1908, **39**: 408. 1911.

Climbing shrubs to 20 m.; branches reddish brown, glabrous, the young branchlets densely ferrugineous-puberulous; pith small, brown, lamellate. Leaves chartaceous, lanceolate to ovate-lanceolate, about 4–7 cm. long and 2–3 cm. broad, acuminate at apex, cuneate at base, the margins minutely setose-denticulate, the upper surface dark,

sparsely and minutely puberulous to nearly glabrous, the lower surface glaucescent, appressed with white stellate-tomentum, the costa and veins scarcely conspicuous above, raised and distinct and covered with brownish pubescence beneath, the secondary veins about 4 or 5 per side, patent-ascending, anastomosing, the veins or their branches ending in the marginal teeth, the veinlets in parallel cross-bars, inconspicuous; petioles 1–1.5 cm. long, brownish pubescent. Inflorescence in axillary cymes, 3–6-flowered, ferrugineous-puberulous; peduncles 3–6 mm. long; pedicels 2–4 mm. long; bracts linear, minute. Flowers greenish; sepals 5, ovate, about 3–4 mm. long and 1.5 mm. broad, rounded at apex, ferrugineous-puberulous without; petals 5, oblong, about 4–5 mm. long and 1.5–2 mm. broad, slightly larger than the sepals, acute or rounded at apex; stamens numerous, the filaments 2–3 mm. long, the anthers yellow, oblong, small, about 1 mm. long, rounded at both ends; ovary subglobose, about 1.5 mm. long, densely ferrugineous-tomentose, the styles about 1.5 mm. long. Fruit very small, ovoid, about 10 mm. long and 7 mm. across, brown, glabrous, with pale roundish lenticels, the persistent sepals reflexed.

Southeastern China (southern Chekiang, southern Kiangsi, Fukien, and northern Kwangtung), on mountain slopes or along river banks, at altitudes of 200–600 meters. Flowers greenish, May–June.

CHINA: Chekiang: Hsien-chü Hsien, *Y. L. Keng* 467 (A), *R. C. Ching* 1595 (A, NY, US), 1714 (A, NY, US); P'ing-yang, *R. C. Ching* 2074 (A, NY, US); Chiang-shan, *R. C. Ching* 2582 (A, NY, US). Kiangsi: Yung-hsiu, *Y. Tsiang* 10635 (NY). Fukien: Nan-p'ing (Yenping), *Hongkong Herb.* 2399 (A, ISOTYPE). Kwangtung: Ta-pu Hsien, *W. T. Tsang* 21222 (A).

This species was described by Dunn from Fukien, based on a single collection, *Hongkong Herb.* 2399, collected on his expedition to central and western Fukien in 1905. A duplicate of this number is available. The known range of the species now extends to the neighboring provinces of Chekiang, Kiangsi, and Kwangtung.

This is a most distinct species, strongly characterized by its small leaves with appressed whitish stellate hairs on the lower surface, the small greenish flowers, and the very small fruits. It little suggests relationships with other species. The stellate-tomentum on the under surface of the leaves is so fine and appressed that Dunn failed to note and describe it in his original description. Later, in his revision of the genus, however, he properly keyed it with other stellate-tomentose species. It is very distinct in this group of species in the cuneate leaf-bases, as well as in the characters mentioned.

#### IMPERFECTLY KNOWN SPECIES

35. **Actinidia kiusiana** Koidzumi, Pl. Nov. Amami-Oshim. 9. 1928, in Bot. Mag. Tokyo 43: (421–422). 1929, in Acta Phytotax. Geob. 9: 98, in clavi. 1940.



A species of the Liukiu Islands and Kiusiu, Japan, of which no specimens are available to me. As the original description, which is very short, was published in an obscure work, it is reproduced below:

"*Actinidia* (*Vestitae*) *kiusiana* Koidz, nov. sp.

This plant seems to be near to *Actinidia strigosa* Hook. of Himalaya, but readily distinguished by the leaves cordate at the base and hispid even in the upper surface.

Arbor ascendens ramis molliter puberulis strigoso-hispidis. Folia membranacea oblongo-ovata 8, 5-13 cm. longa, 4-6 cm. lata, acuta, basi cordata, mucronato-serrata, utraque latere 7-9-penninervia, laxe hispida in utraque pagina, petiolis 2-6 cm longis hispidis.

Nom. Jap. Nagaba-shirakuchizulu.

Hab. The Loochoo archipelago: insula Tanegashima.

Ranges. Kiusiu: prov. Hiuga, Minaminakagun, Ichiimura; Prov. Buzen, Usagun, mount. Gongenzen.

Type specimens: in Herb. Bot. Inst. Kyoto Imp. Univ. Japan."

As the description is based on vegetative parts only, it is not possible to ascertain the real identity of the species. I have not seen any specimens of this genus from the Liukius and Japan that have strigose stems. The nearest species of this group is *A. arisanensis* Hayata of Taiwan, which is a very variable plant. From the brief original description, *A. kiusiana* indeed appears close to *A. arisanensis* and the two may prove to be conspecific.

### 36. *Actinidia longicauda* F. Chun in Sunyatsenia 7: 14. 1948.

The type, *C. S. Chen* 81944, collected from "Kwangsi; Chuen Hsien, Shan-Chuan Hsiang, Ku-Kien An," has not been seen by me. The species known only from the original collection. The flowers are reddish, and they bloom in June.

Chun compares this species with *A. kolomikta* and *A. venosa*, saying that it "Differs from *A. kolomikta* Maxim. in white not brownish pith, long acuminate and elliptic to elliptic-obovate, not broadly ovate-cordate abruptly caudate leaves and in smaller red flowers. The color of the flowers and the shape of the leaves also serve to distinguish it from *A. venosa* Rehd. which has, in addition a tomentose inflorescence and an ovoid subglobose ovary."

Since the fruit is not known, I cannot place it in the proper section from the description. The ovary, which is described as cylindric, the styles not being mentioned, may be the rudimentary ovary of the staminate flowers. The actual shape of the ovary, which is an important diagnostic character among the relatives of *A. kolomikta*, remains to be seen. See also *A. kwangsiensis* for further comments.

## HYBRID

× **Actinidia fairchildii** Rehder in Jour. Arnold Arb. **20**: 421. 1939.

*Actinidia arguta* × *chinensis* Fairchild in Jour. Hered. **18**: 58, f. 7. 1927.

This is the only reported hybrid in the genus. It is a deliberate cross between a staminate plant of *A. arguta* and a pistillate plant of *A. chinensis*, the resulting hybrid showing characters intermediate between the two parent species. The hybrid was raised in Washington, D. C.

DEPARTMENT OF BOTANY,  
U.S. NATIONAL MUSEUM,  
SMITHSONIAN INSTITUTION,  
WASHINGTON, D. C.

STUDIES IN THE BORAGINACEAE, XXII  
NOTEWORTHY SPECIES, CHIEFLY ASIAN AND  
SOUTH AMERICAN

IVAN M. JOHNSTON

***Cordia varronifolia*, sp. nov.**

Frutex 2 m. alta; ramulis plus minusve villulosis in sicco nigrescentibus; foliis elliptico-oblongis vel ovato-oblongis 4–9 cm. longis 2–4 cm. latis, apice obtusiusculis, basi obtusis rotundisve 2–5 mm. longe petiolatis, margine basim versus excepta saepe crenato-dentatis, supra abundanter minuteque areolato-bullatis setis mollibus brevibus basi bulbosis obsitis, subtus elevate reticulato-venosis griseo-villulosis; cymis paucifloris terminalibus vel rare extra-axillaribus initio glomeratis, posterius in cincinnos solitarios vel rare geminatos 1–2 cm. longos excurrentibus; calyce sub anthesi 15–20 mm. longo griseo-villoso 10-costato, tubo 10–12 mm. longo infra medium crassiore (4–8 mm. diametro) apice 3–4 mm. diametro basi rotundato, lobis subulatis flexuosis 5–9 mm. longis in alabastro liberis, sinibus obtusis latis; calyce fructifero ad 28 mm. longo, tubo 17 mm. longo 8–9 mm. crasso; corolla alba marcescenti persistente infundibuliformi 3–3.5 cm. longa, limbo 2.5–3.5 cm. diametro, lobis adscendentibus semi-circularibus 9–11 mm. latis 5–7 mm. longis apice emarginatis, sinibus angustis valde acutis, tubo 2–3 mm. crasso cylindrico ca. 10 mm. longo tubum calycis subaequilongum intus secus bases lineatas decurrentes filamentorum villuloso alibi glabro, fauce ampliata apice ad 12 mm. diametro; filamentis 10–12 mm. longis ca. 10 mm. supra basin tubi corollae orientibus; antheris oblongis ca. 2 mm. longis; ovario glabro 2.5 mm. longo infra medium 1 mm. crasso deinde sursum gradatim attenuato, 4-ovulato 4-loculato inam ad basin nectario annulato inconspicuo circumdato; stylo gracillimo villuloso 15–25 mm. longo 12–20 mm. supra basin furcato, lobis 4 stigmatiferis angustissime oblanceolatis 2–3 mm. longis; fructu exsiccato ovoideo calyce persistenti et tubo corollae persistentis investito supra basin 4–5 mm. crasso deinde sursum angustato (conico, apice rostulato) basi rotundato.

PERU: Pión valley of the Marañon, dept. Cajamarca, prov. Cutervo, 1300–1400 m. alt., shrub 3 m. tall, fl. white, June 1915, *A. Weberbauer 7138* (TYPE, Gray Herb.).

This shrub of northern Peru has the areolate-bullate, frequently dentate leaves suggestive of members of *Cordia* § *Varronia*. Its elongate persisting ribbed calyx and the large persisting marcescent funnelliform corollas suggest those of members of the section *Gerascanthus*. Actually, however, this Peruvian plant has close relations only with *C. parvifolia* DC. (*C. Greggii* Torr.) and *C. elaeagnoides* DC. of Mexico



and so constitutes a third member of the section *Rhabdocalyx*. In size, form and organization of the corolla, calyx and fruit it is most similar to *C. parvifolia*, a species of the deserts of western and northern Mexico. Like that species, furthermore, its flowers appear to be heterostylic. Its fruits have all the distinctive characteristics of the section *Rhabdocalyx*. Indeed, the fruit is almost indistinguishable from that of *C. parvifolia* and *C. elaeagnoides*, being conic-ovoid, dry, and nut-like, having similar proportions and dimensions and developing completely ensheathed by the persistent calyx. The endocarp is thin and herbaceous in texture. It is not fleshy nor colored. The fruit is not a drupe. Its bony endocarp has walls about a millimeter thick and is 4-celled and apparently 4-seeded at maturity. This is a fruit very different from that developed by most *Cordias* and especially by members of the sections *Gerascanthus* and *Varronia*, cf. Johnston, Jour. Arnold Arb. **30**: 85 (1949) and **31**: 179, (1950).

***Cordia iguaguana*, sp. nov.**

Arbor 8–20 m. alta; ramulis juventate tenuiter inconspicueque fulvotomentulosis, maturitate glabratiss; foliis maturitate late lanceolatis 10–15 cm. longis 4–5 cm. latis glabris vel secus costa et petiolo pilulis minutis adpressis sparsissime donatis, apice acutis vel paullo attenuatis, basi obtusis vel rotundis 12–22 mm. longe petiolatis, supra nervis et nervulis abundantibus laeviter impressis ornatis, subtus pallidioribus nerviis (utrinque costae 5–7) et costa prominulis donatis; inflorescentia apice ramulorum hornotinorum foliis juvenilibus gestorum prodita multiflora paniculata vel corymbosa 12–15 mm. diametro; calyce clavato-cylindraceo ca. 11 mm. longo (apicem versus ad 3 mm. crasso) prominenter 10-costato, extus inconspicue puberulento saepe pilulis sparsis ad 0.2 mm. longis adpressis sparse donatis, costis saepe evidenter longitudinaliterque sulcatis, lobis 3–5 saepe inaequalibus obtusis triangularibus ca. 1 mm. longis, sinibus obtusis; corolla alba 23 mm. longa extus glaberrima, limbo ca. 25 mm. diametro, lobis 6–8 mm. longis 8–10 mm. latis supra basin latioribus rotundis vel apice plus minusve truncatis non rariter emarginatis, sinibus angustis acutis, tubo 8–8.5 mm. longo 1–1.5 mm. crasso intus infra medium tomentuloso, faucibus 12–15 mm. diametro ca. 5 mm. profundis, filamentis glabris ore tubi (8–9 supra basin tubi) affixis inaequalibus 1–3 mm. longis, antheris 1.5–3 mm. longis inaequalibus; pistillo (ovario cum stylo) glabro 13–14 mm. longo basi angusta nectario destituto ca. 10 mm. supra basin furcato parte ovuliferi fusiforma 1–1.5 mm. supra basin 0.8–1.2 mm. crasso deinde sursum in stylum gradatim transmutato; fructu ignoto.

PERU: Jaen, dept. Cajamarca, prov. Jean, 700–800 m. alt., tree 8–20 m. tall, fl. white, "Iguaguana," April 1912, A. Weberbauer 6213 (TYPE, Gray Herb.).

A very well marked species of northwestern Peru, apparently restricted to the seasonally dry interandean valleys of the upper Marañón drainage, cf. Weberbauer, Bot. Jahrb. **50**: 92–3 (1914). The tree is

locally known as "iguaguana." It is a member of the section *Gerascanthus*. Only three other species of this section are known from western South America. The best known is the widely distributed and variable *C. alliodora* (R. & P.) Oken, which is readily distinguished by its indument of stellate hairs and by the swellings on twigs and in the inflorescence which serve as ant-domatia. The other members of the section in the area have simple hairs only and are not myrmecophilous. All three are local in distribution and very distinct and easily distinguished. *Cordia Goeldiana* Huber, formerly known only from the state of Para, Brazil, has been recently found in northern Colombia (Pivijay, dept. Magdalena, 1948, R. Romero Castañeda 1106). It has elongate oblong corolla-lobes which have parallel lateral margins. *Cordia macrantha* Chodat is a rare tree of western Ecuador, cf. Little, Caribbean Forester 9: 269 (1948). Like *C. iguaguana* it has broad rounded corolla-lobes. It differs from the Peruvian species in its larger elliptic leaves scantily though evidently villose-hispidulous on the lower surface. Its flowers are also much larger. The corolla is 35–43 mm. long, the limb is 35–40 mm. in diameter, and the sinus between the lobes are truncate rather than acute. The corolla is glabrous except for a tuft of hairs at the base of each filament. The ovary, unlike that of *C. iguaguana*, is short and broad. It is surrounded at the base by a well-developed collar-like nectary, and has the style arising abruptly from its broad summit. The evidence available indicates that *C. macrantha* and *C. iguaguana* are both heterostylic. The type of the latter is probably the long-style form of the species.

***Cordia viridis* (Rusby), comb. nov.**

*Bourreria viridis* Rusby, Descr. 300 So. Amer. Pl. 100 (1920).

VENEZUELA: Lower Orinoco, 1896, *Rusby & Squires 259* (AA, isotype); Guayapo, Bajo Caura, Bolivar, 100 m. alt., 1939, *L. Williams 11745* (G); El Toro, La Paragua, Bolivar, 70 m. alt., 1940, *Williams 12699* (G).

A species of the lower Orinoco Valley which has been confused with *C. sericicalyx* DC. It is readily distinguished once its characters are recognized. The fruit is much larger and is elongate and arises erect, not obliquely from the calyx. Its leaves, though having a similar sparse minute strigosity, differ from those of *C. sericicalyx* in their more acuminate apex and more numerous (about 10) pairs of primary veins.

***Cordia Bridgesii* (Friesen), comb. nov.**

*Varronia Bridgesii* Friesen, Bull. Soc. Bot. Genève ser. 2, 24: 172, f. 9 (1933).

BOLIVIA: Rio Caine, Cochabamba, 1180 m. alt., sandy soil, shrub 3–5 dm. tall, fl. white, Jan. 1949, *M. Cardenas 4239* (G).

The above cited collection agrees with the original description and illustration in all significant details. The only exception is the shorter apical appendages on the calyx-lobes. The original description calls for free appendages 2 mm. long. The collection made by Cardenas has free appendicular tips 0.2–0.5 mm. long. The species is a very well

marked one and was based on a specimen unprovided with precise locality data, collected by Thomas Bridges in Bolivia in 1844 or 45, probably during his journeys north and east of Cochabamba. It was accordingly obtained in the general area where Cardenas also found it.

***Cordia lutea*** Lam. Ill. 1: 421 (1791); Svenson, Am. Jour. Bot. 33: 421 and 478 (1946).

*Cordia marchionica* Drake, Ill. Fl. Ins. Pacific 240 (1892) and Fl. Polynésie Fr. 129 (1893); F. B. H. Brown, [Fl. Southeast. Polynesia 3:] Bull. Bishop Mus. 130: 243 (1935), — based on material from "Iles Marquises (*Mer-cier!*, *Jardin 54!*)."

MARQUESAS ISLANDS: Uahuka, 1921–22, *E. H. Quale 1737* (A); Hatutu, shrub on windward cliff, Sept. 27, 1922, *Quale 1556* (A).

It has been a surprise to discover that *Cordia marchionica* of the Marquesas is the same as the well-known and very distinct *C. lutea* of the Galapagos Islands and the adjacent drier portions of western Ecuador and northwestern Peru. Brown in his detailed account of the flora of southeastern Polynesia reports the plant from most of the islands in the Marquesas group and states that it is common there in dry exposed situations below 1000 m. alt., in places forming thickets or even becoming one of the dominant woody plants.

With the recognition of the Marquesas plant as identical with *C. lutea* of western South America the question arises as to the origin of the species in the archipelago. As a Polynesian plant with clear American relationships it can be used by those seeking evidence of direct floristic affinities between Polynesia and America, cf. A. M. Adamson, Bull. Bishop Mus. 139: 31 (1936). It is conceivable that birds may have played a role in the spread of the species within the Marquesas, but considering the large size of its drupe, any suggestion of direct bird-transportation from America would be fantastic. That the species reached the Marquesas from America in ocean-drift seems equally unlikely. This *Cordia* is not a strand plant. It is a shrub or small tree of arid situations inland where the rainfall is not only scant but also limited to a very few months each year. The seeds of such plants must germinate promptly when moisture becomes available if the seedling is to become established during the short rainy season. Their seeds and any sheathing part of the fruit are necessarily permeable by water and accordingly unadapted for immersion in sea-water and so for successful ocean dispersal. Furthermore, a recent analysis of ocean-dispersed strand plants (Johnston, *Sargentia* 8: 55, 1949) indicates that with very few exceptions such plants have been unsuccessful in colonization across the expanse of the eastern Pacific. It is unbelievable that this *Cordia* could succeed where so many better adapted plants have failed. Any theory that Polynesians may have contributed to its presence in the archipelago is untenable. The plant is said to be used only in making leis, scarcely an important economic use and hardly one to make it important to the native inhabitants. An aboriginal introduc-



tion of the plant from America might be expected only by way of Easter Island, that lonely outlier of Polynesia in the eastern Pacific. Although the environment of Easter Island would seem even more suitable for the *Cordia* than the Marquesas, the plant is absent there. I believe that it is significant that this *Cordia* was not found in the Marquesas by the early visitors to the islands. With its great abundance of large yellow flowers it is a plant not easily overlooked. I am willing to believe that the species was introduced into the Marquesas by the French during the 19th Century, probably as an ornamental plant.

***Eritrichium laxum*, sp. nov.**

Perenne humile dense caespitosis griseum pilis 0.2–0.8 mm. longis saepe adpressis haud abundantibus vestitum; caulibus hornotinis floriferis debilibus gracillimis erectis vel plus minusve decumbentibus 1–6 (in statu fructifero rare ad 12) cm. longis; foliis hornotinis inferioribus 1.5–4 cm. longis spathulato-oblongatis 3–5 mm. latis sub apicem rotundum obtusumve latoribus deinde deorsum in petiolum gracilem anguste alatum gradatim attenuatis, subtus costatis sed enervatis; foliis superioribus paucis ad 1 cm. longis; foliis annuinis desiccatis plus minusve persistentibus saepe (praesertim petiolis) spiraliter tortuosis; inflorescentia laxiflora subracemiformi bracteis foliaceis paucis pedicellos haud suffulcientibus praedita; pedicellis sub anthesi 1–5 mm. longis vel eis medium versus vel infra medium caulis orientibus 5–15 mm. longis; pedicellis fructiferis 5–20 mm. longis gracillimis adscendentibus vel laxe recurvatis; lobis calycis anguste oblongis vel oblanceo-oblongis sparse strigosis ecostatis apice rotundis sub anthesi 1–1.5 mm. longis 0.4–0.5 mm. latis, maturitate ad 2 mm. longis et 0.5–0.6 mm. latis; corolla alba vel dilute caerulea medium versus flava 5–6 mm. diametro; lobis patentibus rotundis ca. 2.2 mm. longis et 2 mm. latis, tubo 1.3–1.7 mm. longo a basi 0.3–0.5 mm. crasso sursum ampliato apice 1.5–1.7 mm. diametro intus 0.2–0.3 mm. supra basin nectario lineato inconspicuo glabro donato, appendiculis faucium flavis vix prominentibus; filamentis 0.15 mm. longis ca. 0.7 mm. supra basin tubi corollae affixis, antheris 0.3 mm. longis; ovario 4-lobato glabro; stylo sub anthesi 0.4–0.5 mm. longo tempore fructifero persistenti 0.5–0.7 mm. longo; nuculis a gynobase hemispherica divergentibus dorsi-ventraliter compressis evidenter marginatis, sine margine 1.2–1.7 mm. longis 0.8–1 mm. latis, dorse obovatis plus minusve hispidulis, margine aculeos 0.3–0.6 mm. longos saepe adscendentes triangulares longe attenuatos apice glochidiatos composito saepissime circumdatis, facie ventrali glabris vel praesertim ultra medium muriculatis aliquantulum ultra medium cicatrice parva donatis ultra cicatricem usque ad apicem nuculi carina 0.3–0.4 mm. longa donatis alibi convexis.

TIBET: Tse La, Langong, lat. 28° 45', long. 94° 00', 14500 ft. alt., little tufts in dry cliff crevices, corolla creamy white, eye golden, very fragrant, *F. Ludlow*, *G. Sherrieff* & *G. Taylor* 5619 (TYPE, Gray Herb.); hills north of

Lhasa, 15000 ft., clumps under large boulders, fl. pale blue with yellow eye, *Ludlow & Sherriff 8806* (G); hills north of Lhasa, 14000 ft., under cliffs and rocks, fl. white to pale blue, *Ludlow & Sherriff 9704* (G); Nyenchengtang La, 4 days N. W. of Lhasa, 14000 ft., on grassy cliff-ledges and under rocks, fl. pale blue, *Ludlow & Sherriff 9648* (G).

CHINA: Chungtien Plateau, N. W. Yunnan, plant 1 in. high, on open stony slope, *K. M. Feng 1598* (G); Riutzila, one day from Atuntze, mountains of Moying, northeast of Yangtze-Mekong watershed, N. W. Yunnan, flower yellow, *J. F. Rock 10332* (G); Kon-ka-ling, Sikang, *T. T. Yu 13005* (G); Kansu, high rocks, 12-13,000 ft., Aug. 1914, *R. Farrer 634* (G).

A very well marked species of southeastern Tibet and adjoining western China where it appears to be the only representative of the genus. From a weak taproot and abundant fibrous roots the plant develops crowded short branched stems abundantly clothed with persisting remnants of old leaves. These hug the soil and form a very dense low cushiony growth which may become at least a decimeter in diameter. From it arise the functional basal leaves and the weak sparingly leafy fertile branches. The herbage is green or grayish green and not silvery silky as with most other species of the genus. The fruit is especially distinctive. The nutlets are dorsi-ventrally compressed and proportionately not so thick as those of other congeners. Furthermore, they have an attachment scar that is slightly, but still very clearly supramedial, rather than medial or inframedial. As a result they have a shorter ventral keel and the under face is low convex rather than boat-shaped or frustum-like. The only fully ripe nutlets studied are those of the type-collection and these were detached and found adherent to the foliage. Most of them have triangular marginal appendages of the type described, but a few have only a thickened marginal rim bearing a few reduced strongly inflexed (not spreading) appendages. This latter type of nutlet possibly may be produced from cleistogamic flowers at the base of the stems, as in *Actinocarya* (cf. Johnston, Jour. Arnold Arb. **21**: 52. 1940) or be the odd nutlet in a heteromomrphic fruit. The precise condition can be determined only when specimens in prime fruiting state become available for study.

***Eritrichium elongatum* Wight var. *Paysoni*, var. nov.**

A forma genuina differt radice gracillima apice caules rosulasque foliorum perpaucas emittenti, innovationibus ut videtur biennis et post tempus fructiferum deciduis; caulibus fertilibus e rosulis foliorum annuinis erumpentibus 2-12 cm. altis rigidis erectis cymas terminales et laterales proferentibus; corolla 2-2.5 mm. diametro; nuculis margine evidenter dentato donatis.

UTAH: La Motte Peak, Uinta Mts., Summit Co., alpine meadows, 11500 ft., July 19, 1916, *E. B. & L. B. Payson 5039* (G); Henry Forks Basin, Uinta Mts., Summit Co., stony slopes and ridges of open forks in upper tree zone above Henry Forks Lake, plants 2-10 (-12) cm. tall, 10850 ft. alt., Aug. 4, 1936, *Bassett Maguire, Dean Hobson, & Ruth Maguire 14385* (TYPE, Gray Herb.); Upper Henry Forks Basin, in stony soil north of Lake Blanchard, common

above timber-line, 11200 ft. alt., plant 3-10 (-12) cm. tall, Aug. 4, 1936, *Maguire, Hobson & Maguire 14346* (G); Krebs Basin, Uinta Mts., Duchesne Co., 11400 ft. alt., southeast slopes, alpine tundra near first of the upper lakes, July 19, 1933, *F. J. Hermann 5038* (G); Uinta Mts., 12000 ft., Aug. 1869, *S. Watson 849* (G)

Over twenty-five years ago I received a collection of the present plant from the late Edwin Payson, who wrote me at the time that having observed it in the field he believed it to be very different from the *Eritrichium elongatum* with which he was familiar in the mountains of Wyoming and Colorado. Despite Payson's belief that an undescribed species was involved, his plant was put away as one of the many minor forms of *E. elongatum*. Subsequently other obviously similar plants have been received. These all came from the Uinta Mts. of northeastern Utah, where no other representative of the genus is known. They all have relatively stout erect branched fertile stems and all appear to be relatively short-lived plants that never develop the woody caudex or achieve the dense pulvinate growth-form of usual *E. elongatum*. I suspect that the plants may live only a few years, probably only two or three. In any case the stems, along with the leaves of the rosette that clothe their base, all die back to the ground after the fruit is matured. There is accordingly no great accumulation of old leaves as in *E. elongatum*. The leafy mass at the base of the plant becomes only 1-5 cm. broad. The nutlets always have a dentate margin and are accordingly unlike the unarmed nutlets of the most common and widely distributed forms of *E. elongatum*. They are, however, very similar, in fact indistinguishable from those of the uncommon form of *E. elongatum*, the var. *argenteum*. The plant of the Uinta Mountains may possibly merit specific rank, but pending further observations by those who can study it in the field it seems best to treat it as a very well marked geographic variety. The name of Edwin Payson is properly associated with it.

### **Trigonotis ciliolata**, sp. nov.

Herba repens; caulibus elongatis 1-1.5 mm. crassis hispidulis pilis divaricatis 0.5-1.2 mm. longis donatis; foliis alternis ovatis 15-22 mm. longis 8-16 mm. latis utrinque pilis 0.5-1 mm. longis rigidulis (in facie superiore laminae adscendentibus, in facie inferiore adscendentibus et erectis) e basi pustulata orientibus obsitis, apice obtusis apiculatis, basi obtusis asymmetricis in petiolum 1-2 mm. latum 2-5 mm. longum abrupte contractis; floribus caulinis solitariis extra-axillaribus saepe circa insertionem petioli orientibus tempore anthesi 2-3 mm. longe pedicellatis, maturitate 10-15 mm. longe pedicellatis; sepalis lanceolatis sub anthesi 4 mm. longis supra basin 1-1.5 mm. latis, maturitate ad 4.5 mm. longis et 1.5-2 mm. latis, sparse hispidulis, apice acutis vel paullo attenuatis; corolla alba, lobis orbicularibus 3-4 mm. diametro; tubo 2.2 mm. longis a basi ca. 1.5 mm. crassa sursum ampliato apice ad 2.8 mm. diametro, appendiculis faucium trapeziformibus prominulis



puberulentis, filamentis 0.4 mm. longis medio tubi corollae orientibus, antheris 0.7–0.8 mm. longis oblongis infra medium affixis; stylo maturitate ad 1.3 mm. longo apices nuculorum vix superanti; nuculus 4 tetrahedraeis nigris laevibus subnitidis angulatis, angulo adaxillari ca. 1 mm. longo, faciebus 3 inferioribus subaequalibus planis; facie superiore nuculae convexa triangulari ca. 2 mm. longa et lata, marginibus ciliolatis (pilulis 0.1 mm. longis) eis lateralibus valde acutis, margine abaxillari anguste alato (ala adscendente curvata 0.2–0.3 mm. lata).

DUTCH NEW GUINEA: Angi, creeping on sandy bank along Iray River, Lake Giji, Arfak Mts., 1900 m. alt., fl. white, April 8, 1940, *R. Kanehira & S. Hatusima 13883* (TYPE, Arn. Arb.).

Though very different in fruit, the present plant simulates *T. abata* very closely in gross habit and vegetative characters and is probably most closely related to it. It comes from western Dutch New Guinea about 600 km. northwesterly from the high mountain valleys, near Lake Habbema, where *T. abata* Johnston (1940) has been collected. The completely glabrous nutlets of *T. abata* are bifacial, having a large convex back, a broadly angled adaxial face, and a superbasal attachment. The very angulate nutlets of *T. ciliolata* are tetrahedral and bear their attachment at the peak of the equally three-sided pyramid. Their fourth surface, the uppermost and outer one, is also triangular but differs in being convex. Its abaxial edge bears an up-curving knife-like wing. Its lateral edges are merely sharply acute. All three of its edges are ciliolate, a unique development in the genus. Unlike most of the repent Malaysian species of *Trigonotis*, *T. ciliolata* has distinctly tetrahedral nutlets generally similar in type to those prevailing in the genus in other regions. Its discovery lends additional support to the belief that the Malaysian species, formerly segregated as *Zoelleria* and *Havilandia*, are, indeed, merely aberrant members of the present genus, cf. Johnston, Jour. Arnold Arb. 21: 58 (1940).

### ***Trigonotis cupulifera*, sp. nov.**

Herba 1–2 dm. alta sparse strigosa (pilis rectis 0.1–0.5 mm. longis antrorsis); caulibus gracilibus erectis subsimplicibus 1–1.5 mm. crassis; foliis firmiusculis ovatis vel ellipticis sparse strigosis 1–2.5 cm. longis 8–12 mm. latis, basi saepe rotundis obtusisve in petiolum abrupte contractis, apice rare acutis plerumque rotundis obtusisve et saepe minute apiculatis; petiolo folii inferiori 1–2 cm. longo folii superiori 2–10 mm. longo; cymis solitariis caulem terminatis et axillis foliorum supremis orientibus gracillimis ebracteatis maturitate ad 8 cm. longis laxifloris; sepalis sparse strigosis sub anthesi 1–1.3 mm. longis 0.6–0.7 mm. latis acutis ovato-lanceolatis, maturitate ovatis patentibus 2–2.5 mm. longis ad 1.3 mm. latis, 0–3 mm. longe pedicellatis; corolla caerulea, limbo ca. 4 mm. diametro, lobis rotundis ca. 1 mm. latis, tubo cylindrico 1 mm. longo 1.3 mm. crasso; staminibus medio tubi affixis; nuculis valde angulatis laevibus glabris tetrahedraeis nitidis 0.8–1 mm. longis, basi haud pedicellatis, facie superiori evidenter

marginatis, margine opaco erecto crassiusculo 0.3–0.6 mm. alto cupulum formanti.

KIANGSI: Lin-chuan, 105 m. alt., by river, fl. white, June 20, 1932, Y. Tsiang 9931 (TYPE, Gray Herb.).

HUNAN: Changsha, along Linyang-ho, 35 m. alt., in thickets, April 25, 1918, *Handel-Mazzetti* 11687 (G).

The collection from Changsha, cited above, is the basis for recent reports of *T. brevipes* Maxim. from China, cf. *Hand.-Mazz. Symb. Sin.* 7<sup>2</sup>: 820 (1936) and Johnston, *Jour. Arnold Arb.* 18: 6 (1937). It consists of plants in flowering state which simulate the Japanese plants closely in vegetative characters and general aspect. The resemblance, however, proves to be deceptive. Now that fruit of the Chinese plant is available for study it is obvious that any resemblances between the Chinese and Japanese plants is superficial and inconsequential. The two differ so widely in nutlets that direct relation between them is unbelievable.

The nutlet of *T. cupulifera* has a smooth, lustrous, acutely angled, distinctly tetrahedral body which is 0.8–1 mm. in length along the inner angle. The total nutlet, however, is actually longer, for its upper face is bordered by an upturned erect thickish marginal flange 0.3–0.6 mm. high. The outer faces of this flange are in the same plane as the flat sides of the nutlet body directly beneath and may appear at first sight to be a continuation of them. Nutlet body and flange, however, are readily distinguished by close examination, since the former has a lustrous and the latter an opaque surface. The shallowly cup-shaped superstructure on the nutlet body is a distinctive feature of our present species.

### ***Trigonotis floribunda*, sp. nov.**

Planta herbacea fortasse rhizomate gracillimo oriens; ramis gracilibus laxe decumbentibus 1–5 dm. longis 1–2.5 mm. crassis saepe laxe longeque ramosis sparse antrorseque strigosis (pilis 0.2–0.8 mm. longis); foliis numerosis caulinis ellipticis vel elliptico-ovatis vel ovato-lanceolatis 2–6 (saepe 3–4) cm. longis 8–27 (saepe 10–20) mm. latis superioribus quam inferioribus saepe duplo vel triplo minoribus, saepe apiculatis costatis sed obscurissime nervatis, apice acutis vel obtusis rotundisve, basi obtusis vel rotundis in petiolum 3–18 mm. longum alatum ca. 1 mm. latum abrupte contractis, facie superiore pilis sparsis 0.3–1.2 mm. longis adpressis vel adscendentibus non rare basi bulbosa vel disciforma orientibus obsitis, facie inferiore antrorse strigosis; cymis numerosis ebracteatis simplicibus vel furcatis 0–5 cm. longe pedunculatis terminalibus et axillis foliorum superiorum orientibus maturitate 5–15 cm. longis dissitifloris; calyce sub anthesi 1.5 mm. longo 0–1 mm. longe pedicellato, lobis oblongis vel elliptico-obovatis 1–1.2 mm. longis, 0.2–0.4 mm. latis; calyce fructifero 2–3 mm. longo 2–3 mm. longe graciliterque pedicellato basi incrassato plus minusve pallido, tubo cupulato, lobis adscendentibus 1.5–2.5 mm. longis ob-

lanceolatis 0.2–0.6 mm. latis basin versus angustatis apice obtusis; corolla caerulescente 2–2.5 mm. diametro, tubo 1 mm. longo cylindrico 1.2 mm. crasso, limbo ad 2 mm. diametro, lobis rotundis 0.7–0.9 mm. longis; staminibus paullo supra medium tubi corollae affixis; nuculis 4 angulatis tetrahedraeis laevibus glabris nullo modo pedicellatis, angulo adaxillari 1 mm. longis, angulo facies superiorem aliquantulum concavam circumdato acutissimo prominulis, apice nuculis inconspicue producto et sursum curvato.

WESTERN SZECHUAN: Mt. Omei, Fu-hu-sse, roadside, 3 dm. tall, fl. blue, May 14, 1942, *W. P. Fang 18747* (G); Mt. Omei, Tru-dien, May 28, 1941, *Fang 16747* (G); Mt. Omei, Hong-train-ping, 35 cm. tall, May 21, 1940, *C. L. Sun 2124* (G); Mt. Omei, Hong-train-ping, fl. blue, July 8, 1940, *T. C. Lee 2704* (G); Mt. Omei, Hung-chun-ping, roadside, 950 m. alt., June 16, 1938, *H. C. Chow 7532* (G); Mt. Omei, Hung-chun-ping, roadside, May 22, 1944, *H. C. Chow 11851* (G); Mt. Omei, Kuan-hsin-an, ditch, fl. bluish, 1378 m., July 17, 1939, *S. C. Sun & K. Ghang 877* (TYPE, Gray Herb.); Mt. Omei, 950 m. alt., about thicket, fl. bluish, July 1, 1931, *F. T. Wang 23129* (G); Mt. Omei, 850 m., hillside, plant 2.5 dm. tall, fl. blue, July 18, 1938, *T. C. Peng 17* (G); without locality, *Faber 598* (NY).

KWANGSI: Nan Kan, Ling Yü Hsien, valley shade, fl. bluish, Apr. 13, 1933, *Steward & Cheo 184* (G).

This plant, and also *T. laxa*, were incorrectly identified as *T. omeiensis* Matsuda (1919), in my synopsis of the *Trigonotis* of southern China, Jour. Arnold Arb. **18**: 6 (1937). Matsuda's species properly belongs in the synonymy of the very different *T. Cavaleriei* (Lev.) Hand.-Mazz. Our present plant is without a name. Its closest relative is *T. laxa*. Among its distinctive features are the up-curving corners of the upper face of the nutlet and the mineralized pallid epidermis developed on the thickened base of old fruiting calyces.

### ***Trigonotis laxa*, sp. nov.**

Herba ut videtur perennis; caulibus 2–5 dm. longis 1–2.5 mm. crassis simplicibus vel sparse ramosis sparse strigosis; foliis caulinis costatis sed enervatis, lamina elliptica vel ovato-elliptica vel late lanceolata saepe 2–3 cm. longa et 6–15 mm. lata, apice obtusa vel rotunda et apiculata vel rare acuta, basi obtusa rotundave in petiolum 3–10 mm. longum alatum 1–2 mm. latum contracta, supra glabra vel apicem versus sparse strigosa, subtus sparse strigosa (pilis 0.2–0.5 mm. longis non rare basi incrassata disciformave orientibus); inflorescentia terminali et axillis supremis orientibus; cymis gracillimis ad 1 dm. longis furcatis 1–8 mm. longe pedunculatis ebracteatis; corolla subcaerulea vel subalba, limbo 5 mm. diametro, lobis rotundis 1.5 mm. latis, tubo 1–1.5 mm. longo a basi ca. 1 mm. crasso sursum gradatim ampliato apice ad 1.8 mm. diametro; staminibus medio tubi affixis; calyce subanthesi 1.5–2 mm. longo 0.3–1.5 mm. longe pedicellato sparse strigoso, lobis obovatis 1.7 mm. longis 0.3–0.4 mm. latis apice rotundis; calyce fructiferi 2 mm. longo ad 6 mm. longe pedicellato, lobis laxe



adscendentibus 0.4–0.6 mm. latis obtusis; nuculis acute angulatis 4 tetrahedraeis haud pedicellatis glabris laevibus, angulo adaxiale ca. 1 mm. longo, facie superiori margine angustissime alato circumdata; stigmatibus nuculis breviter sed distincte superantibus.

SZECHUAN: Nanchuan Hsien, roadside, 8000–9000 ft., fl. white, May 25, 1928, *W. P. Fang 915* (G); Nanchuan Hsien, roadside, 8000–9000, herb 1–1.5 ft. tall, fl. pale blue, May 31, 1928, *W. P. Fang 1159* (G); roadside, 5000–6000 ft., herb 1 ft. tall, fl. pale blue, June 1, 1928, *W. P. Fang 1348* (TYPE, Gray Herb.).

This plant of southeastern Szechuan is most closely related to *T. floribunda* of western Szechuan and western Kwangsi. It differs in having a larger corolla with an ampliate rather than cylindrical tube, a protruding style, broader and shorter calyx-lobes, and different nutlets. The mature calyx, unlike that of *T. floribunda*, does not have a noticeably thickened base covered with mineralized epidermis, nor does it develop a short but distinct cupulate tube. In the fruit the upper faces of the nutlets slope away from one another much less steeply than those of *T. laxa*. In *T. floribunda*, but not in *T. laxa*, the corners of the upper nutlet face are characteristically up-curving. The margin about the upper nutlet face in *T. laxa* tends to become very narrowly winged on the side opposite the nutlet apex. In *T. floribunda* the nutlet angles are acute and with a suggestion of a wing, but the latter is not so pronounced as in *T. laxa*. The relationship between the two species is very clear, but the two are certainly distinct.

***Microula blepharolepis* (Maxim.), comb. nov.**

*Omphalodes blepharolepis* Maxim. Bull. Acad. St. Petersbourg ser. 3, **27**: 504 (1881) and Mel. Biol. **11**: 269 (1881); Brand, Pflanzenr. Heft **78**: 105 (1921).

***Microula diffusa* (Maxim.), comb. nov.**

*Omphalodes diffusa* Maxim. Bull. Acad. St. Petersbourg ser. 3, **27**: 504 (1881) and Mel. Biol. **11**: 270 (1881); Brand, Pflanzenr. **78**: 106 (1921).

I am indebted to Prof. W. Th. Kuprevicz, Director of the Komarov Botanical Institute, Leningrad, for the great privilege of examining the types of *Omphalodes blepharolepis* and *O. diffusa*. These species, based on material from western China, in the region south and southwest of Lake Kokonor, are very definitely members of *Microula*, a genus well developed in the area of Lake Kokonor south into Yunnan. In technical characters and general appearance they are obviously members of *Microula*. Both species are well marked and distinct from any heretofore seen by me.

***Cryptantha Weberi*, sp. nov.**

Planta perennis caespitosa pallida e radice palari oriens caudice denso humili multicapitali proferens; caulibus numerosis erectis foliosis 10–18 cm. longis supra medium floriferis, plus minusve hispidis (pilis

patentibus 1–2 mm. longis) et abundanter hispidulo-villulosis (pilulis 0.2–0.3 mm. longis saepe retrorso-adpressis); foliis pallidis numerosis abundanter hispidulo-villulosis (pilulis adpressis 0.1–0.3 mm. longis) et hispidis (pilis 1–2.5 mm. longis basi incrassato orientibus adpressis vel praesertim secus marginem laminae adscendentibus vel rare patentibus) anguste oblanceolatis apicem versus latioribus firmis inconspicue costatis margine vix revolutis apice rotundis obtusisve; foliis basalibus confertis tempore florendi vigentibus 3–8 cm. longis 3–7 mm. latis; foliis caulinis numerosis medionalibus eis basalibus similibus sed minoribus 2–3 cm. longis 2–4 mm. latis; foliis supra medium caulis cymis axillaribus breviter pedunculatis suffultis; inflorescentia cylindrica infra medium bracteis exsertis donata, juventate densa 1.5–2 cm. crassa 4–6 cm. longa, maturitate plus minusve interrupta 2–2.5 cm. crassa 8–10 cm. longa; cymis abundantibus sub anthesi glomeratis 5–8 mm. longis, fructiferis 10–15 mm. longis; calycibus ad anthesim 3–4 mm. longis, fructiferis 5–6 mm. longis, 0–8 mm. longe pedicellatis, lobis basi 0.7–1 mm. latis sursum angustatis, inconspicue costatis sparse hispidis (pilis ca. 1 mm. longis) et dense hispidulo-villulosis apice rotundis; corolla alba, tubo cylindrico 3 mm. longo ad 2 mm. crasso, lobis suborbicularibus 2–2.5 mm. diametro, limbo 4–6 mm. diametro; staminibus supra medium tubo corollae (0.5–0.7 mm. infra faucem) affixis; stylo cum gynobasi 3.5–4 mm. longo; stylo 1.5–1.8 mm. longo; nuculis 2–2.3 mm. longis 1.3–1.8 mm. latis ovatis fere symmetricis compressis angustissime marginatis, ventre sublaevibus sulcatis (sulco aperto anguste cuneato ad 0.5 mm. infra apicem nuculae attingentibus), dorse tuberculis et rugis brevibus irregularibus plus minusve transversis sparse donatis.

COLORADO (Saguache County): along road to Stone Cellar Ranger Station and Saguache Park, near junction of main highway, 4 miles west of Cochetopa Pass, volcanic ash deposit, 9700 ft., with *Aster coloradensis*, *Senecio Hallii* and *Penstemon secundiflorus*, July 28, 1950, William A. Weber 5778 (TYPE, Gray Herb.); dry knoll one mile north of Stone Cellar Ranger Station, 9000 ft., July 7, 1936, Reed C. Rollins 1323 (G); Cárnero Ranger Station, Cochetopa Forest, scattered on lower slopes, 10000 ft., June 20, 1922, C. E. Taylor 573 (G).

A very well marked species of the mountains of south central Colorado for which I can suggest no close relative. In Payson's revision of *Cryptantha* § *Oreocarya*, Ann. Missouri Bot. Gard. 14: 239, 240 (1927), it keys out to *C. virgata*. In Brand's treatment, Pflanzenr. Heft 97: 79 (1931), it keys out to *O. rugulosa*. The caespitose and perennial habit, different indument and smaller nutlets with open scar all readily distinguish it from the very different *C. virgata*. *Cryptantha rugulosa* shows greater similarity with *C. Weberi* but differs in indument, in the cylindric thyrses of short cymes, small nutlets, etc.

Two flowering collections of the species have been known for over ten years. Though recognized as representing what was evidently an unnamed plant, they have not been used in describing the species, since

they lack fruit. For at last receiving material of the plant in mature state I am indebted to Professor William A. Weber, of the University of Colorado, who made a special visit to the mountains of Saguache County in search of it. It is with great pleasure that I associate his name with the species.

***Craniospermum mongolicum*, sp. nov.**

Herba humilis multicaulis ut videtur perennis et 5–6 cm. alta; caulibus hornotinis 6 cm. longis infra medium simplicibus supra medium cymas brevipedunculatas axillares dense dispositis proferentibus sparse hispidis (pilis patentibus vel adscendentibus 1–2 mm. longis) et hispidulis (pilulis 0.4–0.8 mm. longis retrorse adpressis); foliis firmis enervatis villuloso-hispidulis (pilulis saepe retrorse adpressis 0.3–0.9 mm. longis vix abundantibus) et sparse hispidulis (pilis rigidis e basibus pallidis incrassatis prominulis erumpentibus facie superiore et praesertim margine laminae folii gestis) foliis basalibus congestis tempore florendi marcidis oblanceolatis 1–2 mm. latis 8–11 mm. longis; foliis caulinis oblanceolatis 15–20 mm. longis 3–4 mm. latis apice acutis obtusisve; calyce 5-partito hispidulo sub anthesi 5 mm. longo mox ad 8 mm. longo, lobis subaequalibus oblango-lanceolatis apice obtusis pedicello ad 1 mm. longo; corolla ca. 7.5 mm. longa glaberrima, tubo cylindrico 2.5 mm. crasso, faucibus 2 mm. longis apice 4 mm. crassis, lobis caerulescentibus adscendentibus nervatis 1.5 mm. longis a basi ca. 1.5 mm. lato sursum laeviter attenuatis apice rotundis; staminibus basim versus faucis (ca. 4 mm. supra basin corollae) affixis e plicis intrusis extus foveolatis orientibus glaberrimis; filamentis 5–6 mm. longis e fauce corollae 3–4 mm. longe exsertis ligulato-linearibus basin versus aliquantum ampliatis basi imo geniculatis; antheris 0.5–1.2 mm. longis; stylo filiformi glabro longe exserto; nuculis maturis homomorphis 3.5 mm. longis cinereis minute verrucosis sparse tuberculatis, dorse supra medium foveola conspicua donatis.

OUTER MONGOLIA: Daying Gol, dry hills at 5500 ft. alt., 1925, *R. W. Chaney* 195 (TYPE, Gray Herb.).

From the other members of the genus this well-marked species differs in having a low compact growth habit, hispid or hispidulous rather than villous indument, and a branched inflorescence. Furthermore, its filaments are not entirely linear nor do they arise directly from the walls of the corolla. They are broadened towards their geniculate base and each arises from a small protuberance situated low in the corolla throat. On the outside of the corolla the location of each filament-bearing protuberance is marked by a small but distinct depression. The plant appears to have a perennial root. From it arise a number of short stems about 6 cm. long. These stems bear not only terminal cymes but also numerous, equally well developed lateral ones from the four to six axils above its middle. The inflorescence is obviously compound. It is dense, 2.5–3.5 cm. long, and the most conspicuous part of the plant. In other species the inflorescence consists of a solitary



subcapitate glomerule borne terminal on each stem. These stems are better developed than those in *C. mongolicum* and are more elongate and very much more leafy. In the most recent account of *Craniospermum*, Pflanzenr. Heft **97**: 102-3 (1931), Brand recognizes three members of the genus, *C. canescens* DC., *C. subvillosum* Lehm., and *C. subfloccosum* Krylow. All these are closely related, so closely in fact that they may be no more than forms of a single somewhat variable species. They grow in southern Siberia along the Mongolian border from the west of the Altai east to beyond Lake Baical. The proposed new species is more southerly, occurring along the southern extension of the Altai in western Outer Mongolia. The type was obtained at Daying (or Da-Ying) Gol, a stream heading in the Baga Bogdo Range and flowing north into Tsagan Nor, about long.  $101^{\circ} 30'$  and lat.  $45^{\circ} 5'$ . It was distributed misidentified as "*Arnebia guttata*."

**Trichodesma calycosum** Collett & Hemsl., Jour. Linn. Soc. Bot. **28**: 92 (1890); Lacaita, Jour. Linn. Soc. Bot. **43**: 476 (1916) — type from Burma; "Shan hills at 4000 feet."

*Lacaitaea calycosa* (Coll. & Hemsl.) Brand, in Fedde Repert. **13**: 81 (1914) and Pflanzenr. Heft **87**: 44 (1921).

*Trichodesma Hemsleyana* Levl. in Fedde, Repert. **9**: 327 (1911) and Fl. Kouy Tcheou 55 (1914); Brand, Pflanzenr. Heft **78**: 43 (1921) — type from "Kouy-Tcheou [Kweichow, China], *J. Esquirol* 745."

*Trichodesma sinicum* Brand in Fedde, Repert. **12**: 504 (1913) and Pflanzenr. Heft **78**: 43 (1921) — type from Szemao, southern Yunnan, *Henry* 10124 D.

*Trichodesma calcareum* Craib, Kew Bull. **1914**: 8 (1914) — type from northern Siam, "Doi Chieng Dao, crevices of limestone rock, 900 m., *Kerr* 2856."

*Trichodesma khasianum* var. *calcareum* (Craib) Brand, Pflanzenr. Heft **78**: 33 (1921).

*Octosomatium Kerrii* Gagnep. Not. Syst. **14**: 23 (1950) — type from Laos, Indo-China; Muong-Khao, Xieng-Khouang dist., ca. lat.  $19^{\circ} 50'$  and long.  $103^{\circ} 30'$ , *Kerr* 20978.

Known from Burma (north of lat.  $22^{\circ}$ ) and from China (western and southern Yunnan; Kweichow) south to about lat.  $19^{\circ}$  in northern Siam and adjoining Indo-China; also in Sikkim.

BURMA: Kanpetlet, Chin Hills, 7500 ft., hillside, fairly common, shrub 15 ft. tall, trunk 3 in. thick breast-high, fl. white, *F. G. Dickason* 8425 (A); Webula (Falam), damp ravines and open mountain slope at 4000 ft., fairly common, shrub 8-10 ft. tall, *Dickason* 7347.

INDO-CHINA: Muong-Khao, Xieng-Khouang, Laos, *Kerr* 20978 (Paris, TYPE of *O. Kerrii*; fragment received on loan).

CHINA: Yunnan: Salween Valley, lat.  $25^{\circ} 6'$ , in open scrub at 4000 ft., shrub 20 ft. tall, *Forrest* 13665 (A); Salween Valley, lat.  $25^{\circ} 10'$ , long.  $98^{\circ} 50'$ , open dry situations on margin of scrub, half shrubby plant 3-4 ft. tall, *Forrest* 19341 (A); Lan-Tsang Hsien, 1100 m. alt., woody plant on mountain slope, *C. W. Wang* 73127 (A); Mengtse, 5000 ft. alt., shrub 3 ft. tall, fl.

white, *A. Henry 10124* (A, NY); Lunan, shrub 5 ft. tall, fl. white, *Henry 10124A* (A, NY); Chu-yuan, shrub 3 ft. tall, *Henry 10124B* (A, NY); Red River Valley, Manpan, 4000 ft., shrub 4 ft., fl. white, *Henry 10124C* (A); Szemao, 5000 ft., shrub 10 ft. tall, fl. white, *Henry 10124D* (A, isotype of *T. sinicum*). Kweichow: Lo fou, Feb. 1909, *J. Cavalerie 3498* (G); without locality, *J. Esquirol 745* (G, photo & frag., type of *T. Hemsleyana*).

A study of the recently published *Octosomatium Kerrii* Gagnep. reveals it to be a synonym of the present plant, which now has accumulated four different trivial names and has twice been made the type of a monotypic genus, i.e. *Lacaitaea* Brand and *Octosomatium* Gagnep. It is a large shrubby plant with broad opposite leaves, which grows 1-6 m. tall and has fruit and flowers characteristic of *Trichodesma* in all details save only for the 8-10 gibbose intrusions developed in the corolla throat. Unlike most congeners it is not a desert or steppe plant but rather an inhabitant of the tropical forest.

The invaginate appendages present in the corolla throat of *T. calycosum* are of special interest. No other member of the genus has similar appendages, and furthermore, no other member of the entire Boraginaceae has them in so large a number. The corolla of *T. calycosum*, though usually pentamerous, is occasionally tetramerous and bears two gibbose appendages in the throat opposite each corolla-lobe. In other Boraginaceae the faucal appendages are traversed medially by the primary vein leading to the corolla-lobe and accordingly occur singly in the throat opposite the middle of the lobe. In *T. calycosum* the two appendages opposite each lobe arise lateral to the vein which courses between them. The condition, though unique in the family, is readily homologized. Many of the Boraginaceae with well-developed faucal invaginations have the invagination more or less strongly retuse at the summit. The vein leading to the corolla-lobe is detoured over the summit of the invaginate appendage. In those appendages that are lobed or emarginate at the summit its course over the summit lies at the bottom of the apical sinus. Should the appendage become strongly bilobed or parted, the vein would have no detour and would pass directly between the halves of the appendage, which would then appear double. The supernumerary appendages of *T. calycosum* probably had some such origin.

It is interesting to speculate why double faucal appendages should have developed only in this species of *Trichodesma*. The genus is a member of the Cynoglosseae, the most highly evolved tribe in the Boraginaceae, in which faucal appendages are usually well developed. Their loss in *Trichodesma* is probably associated with the elaboration of the androecium, in which the large anthers, held together by twisted tips, form a large protruding cone that controls all access to the corolla-tube. Faucal appendages, alternating with the anthers, would hinder rather than guide the proboscis of an insect seeking the slit between the closely juxtaposed anthers. This is obviated by the divided

faucal appendages of *T. calycosum*. In that species they probably represent a modification and persistence of an ancestral character. As a general rule, in any large natural group such as *Trichodesma*, ancestral characteristics are more frequently retained by the shrubby or arborescent than by the herbaceous members. The latter, with a short life history and more frequent generations, can be expected to vary more rapidly and so deviate more from the ancestral than do the woody and arborescent congeners. Significantly, *T. calycosum* is the most robust member of the genus, and with the possible exception of *T. khasianum* Clarke, the only large shrub in the genus. The normal single faucal appendages of the Cynoglosseae having no function and being perhaps even disadvantageous in the *Trichodesma* flower, have been eliminated in most species of the genus. In *T. calycosum*, divided and so no longer hindering insects seeking the nectaries at the bottom of the floral cup, the appendages appear to have persisted as non-functional innocuous structures not yet eliminated in the course of evolution.

Brand states frankly that *T. calycosum*, though admittedly otherwise typical of *Trichodesma*, should, because of its faucal appendages, be segregated to form the monotypic genus *Lacaitaea*. Gagnepain, in establishing the synonymous genus *Octosomatium*, gives no intimation that he recognized the obvious affinities of the plant with *Trichodesma*. He considered the plant remarkable because of its opposite leaves, the prominent line on the stem joining the attachments of opposing leaves, the tetramerous flowers (of his specimen), and finally, the double faucal appendages of the corolla. Of the characters mentioned by him only the faucal appendages are notable when the plant is compared with *Trichodesma*. They alone are distinctive of *T. calycosum* and they alone constitute the only character of possible generic value that can possibly justify any proposal that the species be given special recognition as representing a monotypic genus distinct from *Trichodesma*.

In estimating the importance to be placed on the faucal appendages of *T. calycosum*, I am influenced by the remarkable similarity existing between that species and *T. khasianum*. The latter ranges just west of *T. calycosum* and like it is a shrub of monsoonal forests. *Trichodesma khasianum* has absolutely no faucal appendages, has less hairy anthers, and usually has more conspicuously white-dotted upper leaf-surfaces, but except for these differences the two species are extremely alike, so much so that any doubt as to their extremely close relationship is inconceivable. These two species belong together in one and the same genus! To disassociate them generically on the basis of one character is arbitrary and unnatural. I am, accordingly, content to assign *T. calycosum* as well as *T. khasianum* to *Trichodesma* § *Friedrichsthalia*, a section containing several African species which also have ample opposite leaves combined with frutescent habit.



**Trichodesma calycosum** var. **formosanum** (Matsumura), comb. nov.

*Trichodesma formosana* Matsumura, Bot. Mag. Tokyo **12**: 108 (1898) —

"Hab. Formosa: in montosis ad Taichu (Y. Tashiro, no. 35); Tenkachilasha, Shu-shu-kai (C. Owatari)."

*Trichodesma khasianum* sensu auct. Formos.; S. Sasaki [Cat. Govt. Herb.]

Dept. Forestry, Taihoku, Formosa, Report **9**: 431 (1930); D. Hou, Taiwania **1**: 212 (1950).

FORMOSA: Kinkwaseki, *T. Ito* (A, photo); South Cape, *A. Henry* 286 & 939 (A); Boryo to Kuraru, prov. Koshun, south Formosan common shrub 3-6 ft. tall, fl. blue, *E. H. Wilson* 11014 (A); prov. Nanto, low altitudes, common bush, 6-12 ft. tall, *Wilson* 9831 (A); [Bankinsing], *Henry* 1239 (NY); Taito-cho, Shikano, 1931, *Tanaka* 10462 (NY).

This plant of Formosa has been reported numerous times as "*Trichodesma khasianum*." Actually it is scarcely separable from *T. calycosum*. Indeed, it is distinguishable only by the arrangement of hairs on the back of the anthers. In the plant of Formosa these hairs are appressed and have the appearance of having been combed in different directions, left and right, from the mid-line of the anther. The hairs of the anthers of the continental plant are less appressed and do not have the combed, orderly appearance. The difference is a minor one, and only because it seems to be geographically correlated does it merit nomenclatorial recognition.

ARNOLD ARBORETUM,  
HARVARD UNIVERSITY.

STUDIES IN THE THEACEAE, XXV  
THE GENUS *ANNESLEA*

CLARENCE E. KOBUSKI

THE THEACEOUS GENUS *Anneslea* was first described and illustrated by Wallich in his *Pl. As. Rar.* 1: 5, t. 5. 1829. One cannot but be impressed by the manner in which the genus was presented. The details offered in the description, along with the excellent plate, produce a picture hard to duplicate even today.

According to G. Don, the genus was named *Anneslea* "in honor of George Annesley, Lord Mountnorris, F. R. and L. S., who collected many plants on his travels in the north of Africa and the south of Europe, while Viscount Valentia." It is fortunate that the name has been included in the list of *nomina conservanda*, since other genera had been described earlier under the same name. One of these, *Anneslia* Hooker ex Salisbury (1807), belonging to the Leguminosae, has had over a hundred species attributed to it; while *Anneslea* Roxburgh ex Andr. (1810), belonging to the Nymphaeaceae, has had three species described.

*Anneslea* is one of the three genera of the Theaceae recorded as having an inferior or subinferior ovary. The other two are *Visnea* Linnaeus f. (1781) and *Symplocarpon* Airy-Shaw (1937). The geographical distribution of these three genera is very interesting in that they are so far removed from one another. *Anneslea* grows in tropical and subtropical Asia, extending from southern China through Burma, Indo-China and Malaya, into Sumatra. The islands of Formosa and Hainan have both recorded the genus. The relationship of *Anneslea* is clearly with *Ternstroemia*. *Symplocarpon* is found in tropical America, and its relationship is with the American species of *Cleyera*. So close are the last two mentioned genera in appearance that when in flower it is difficult to separate them. On the other hand, *Visnea* is confined to the Canary Islands and Madeira and has no immediate generic relative, since it is the only species of Theaceae growing in this area.

Five synonyms have been recorded for *Anneslea* during the past century. In checking the literature, I find that all the synonyms except *Richtera* Reichenbach clearly pertain to this genus. *Richtera* was recorded in a listing of genera by Reichenbach with no description or reference to herbarium material. Both Dalla Torre & Harms (1907) and Melchior (1925) record the name as a synonym of *Anneslea*. I feel that I am correct in assuming that a specimen bearing this name had been seen by these authors and thus associated with the genus. The name *Mountnorrisia*, introduced by Szyzylowicz, refers also to

George Annesley. The name was cleverly used by the author, since at the time (1893) he recognized the priority of the other two *Annesleae* and could not foresee the eventual inclusion of Wallich's genus among the *nomina conservanda*.

In 1948 Gagnepain described a new genus, *Paranneslea*, which he separated from *Anneslea* by the following characters: (1) the anthers not mucronate by a prolongation of the connective, but bi-mucronate by lateral projections of the cells; (2) a five-parted stigma; (3) the cells of the ovary 2-ovulate; and (4) the peduncles solitary in the axils of the leaves.

Gagnepain states that it is difficult to designate the genus to which *Paranneslea* is most closely related. Except for the four differences listed above, the plant described would fall into *Anneslea fragrans* — and after detailed study of the genus (*Anneslea*), some of the characters listed by Gagnepain lose their importance.

Because of Gagnepain's proposed new genus, I made many more dissections of both flowers and fruits than I would otherwise have made. Some interesting results were obtained — results not unexpected in this family, however. Whereas the genus *Anneslea* was originally described as having three cells in the ovary and fruit and a three-parted stigma, I discovered that two-celled ovaries and fruit were more prevalent than three-celled and were found in a ratio of two to one. Also, there is no true relationship between the number of divisions in the stigma and the cells of the ovary. Three-parted stigmas were more prevalent even in flowers with two-celled ovaries.

As to the five-parted stigma of *Paranneslea*, this is not an unusual variation within genera of this family. The genus *Eurya* has dominantly a three-parted style. However, it has been discovered that a five-parted style is not unusual, and occasionally four-parted styles may be found.

The number of ovules in the cells of the ovary varies considerably in *Anneslea fragrans* and cannot be used as a diagnostic character in the separation of species, to say nothing of genera.

The mucronate anther cells are distinct from all the material of *Anneslea* that I have studied. However, it is not unusual to find this character present or absent in members of other genera of the family.

The fourth point, peduncles solitary in the axils of the leaves, is the most distinctive character listed by Gagnepain.

The three characters (1) flowers solitary in the axils of the leaves; (2) five-parted style; and (3) the mucronate anther cells, constitute points worthy of specific, but hardly of generic delimitation. True enough, they contribute a remarkable variation from the so-called other species of *Anneslea*. However, except for *Anneslea donnaiensis* and *A. steenisii* (Sumatra) I feel that all other known material of the genus belongs to the single species *A. fragrans* with five regional varieties.



**Anneslea** Wallich, Pl. As. Rar. **1**: 5, t. 5. 1829. — G. Don, Gen. Syst. **1**: 565. 1840. — Endlicher, Gen. Pl. 1018. 1840. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève **14**: 129 (Mém, Ternstr. 41). 1855. — Bentham & Hooker, Gen. Pl. **1**: 182. 1862. — Baillon, Hist. Pl. **4**: 258. 1873. — Kurz, For. Fl. Brit. Burma **1**: 98. 1877. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 143. 1925. — Lemée, Dict. Pl. Phan. **1**: 289. 1929. — Keng in Taiwania **1**: 254. 1950. — Non *Anneslia* Hooker (1807), Leguminosae; nec *Anneslea* Roxburgh (1810), Nymphaeaceae.

*Richtera* Reichenbach, Repert. Herb. Nomencl. Gen. Pl. 208. 1841, nomen. — Dalla Torre & Harms, Gen. Siphonogamarum Suppl. 622. 1907, as syn. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 143. 1925, as syn.

*Callosmia* Presl, Bot. Bemerk. 103. 1844.

*Daydonia* Britten in Jour. Bot. **26**: 11. 1888.

*Mountnorrisia* Szyszyłowicz in Nat. Pflanzenfam. III. **6**: 189. 1893.

*Annesleya* Post & Kuntze, Lexic. Gen. Phan. 32. 1903.

*Paranneslea* Gagnepain in Bull. Soc. Bot. France **95**: 29. 1948.

Calyx persistent, imbricate, bi-bracteate at the base, deeply parted into 5 lobes, the lobes unequal. Petals 5, imbricate, connate at the base, deeply constricted at the middle. Stamens 30–40, distinct, in a single or in double series, the filaments inserted on the torus, the anthers linear, usually longcuspidate. Ovary imbedded in the torus, 2- or 3-celled with a few to several ovules in each cell; ovules suspended from the apex of the placenta, the style entire, persistent, the stigmas usually 3, occasionally 2 or 5. Fruit inferior, subglobose, subligneous, crowned by the persistent calyx, 2- or 3-celled, the cells 1–3-seeded. Seeds pendulous, arillate, the embryo curved.

Trees or shrubs with alternate coriaceous persistent leaves.

TYPE SPECIES: *Anneslea fragrans* Wallich.

## KEY TO THE SPECIES

- A. Flowers crowded at the apex in a compact spiral arrangement; stigmas 3 or 2; the connective of the anther projected into an apicule usually 1–2 mm. long.
    - B. Petals connate at the base for 4–5 mm., deeply constricted on each side at the middle, appearing in outline like an hourglass. . . . . 1. *A. fragrans*.
    - BB. Petals joined only lightly at the very base, the sides entire with no middle constriction. . . . . 2. *A. steenisii*.
  - AA. Flowers solitary in the axils of the leaves; stigmas 5; individual anther cells apiculate, not a single apicule from the projected connective . . . . . 3. *A. donnaiensis*.
1. **Anneslea fragrans** Wallich, Pl. Asiat. Rar. **1**: 5, t. 5. 1830. — G. Don, Gen. Syst. **1**: 566. 1840. — Griffith, Icon. Pl. As. t. 585, fig. 17, 1854. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève **14**: 129 (Mém. Ternstr. 41). 1855. — Dyer in Hooker f., Fl. Brit. India **1**:

280. 1872. — Kurz, For. Fl. Brit. Burma 1: 98. 1877. — Mason, Burma People Prod. (Bot.) 2: 630. 1883. — Pierre, Fl. For. Cochinch. 2: pl. 127. 1887. — Brandis, Ind. Trees 58. 1906. — Pitard in Fl. Gén. Indo-Chine 1: 335. 1910. — Craib, Fl. Siam Enum. 1: 123. 1925. — Melchior in Nat. Pflanzenfam. ed. 2, 21: 143. 1925. — Gagnepain in Fl. Gén. Indo-Chine Suppl. 1: 278. 1943.

*Callosmia fragrans* (Wallich) Presl, Bot. Bemerk. 103. 1844.

*Anneslea fragrans* a *typica* Pierre, Fl. For. Cochinch. 2: t. 127. 1887.

*Mountnorrisia fragrans* (Wallich) Szyszylowicz in Nat. Pflanzenfam. III. 6: 189. 1893.

Small tree to 15 m. (occasionally shrubs or very large trees); branches terete, glabrous, gray. Leaves coriaceous, few, disposed near the apex of the branchlets, glabrous, lanceolate, oblong-lanceolate, rarely obovate, (4.5–) 10–15 (–18) cm. long, (2–) 3–5 (–8) cm. wide, acute at the apex, occasionally obtuse, rarely rounded, usually cuneate at the base, tapering along and into the petiole (2–3 cm. long), punctate below, the margin entire, subrevolute, with occasional minute glands (seen only with a lens); the midrib canaliculate above, elevated below, the veins 10–12 pairs elevated below, sometimes quite inconspicuous. Inflorescence consisting of several to many individual flowers in a compact spiral arrangement, subapical, terminating the season's growth, subtended by or occasionally intermixed with a few (ca. 3) subverticillately arranged leaves; pedicels glabrous, usually 5–6 cm. long, often 2–3–4 cm. long, narrowest at the base; bracteoles 2, opposite or nearly so, immediately below the calyx, broadly ovate to deltoid, occasionally rounded, 4–4.5 mm. long, ca. 3 mm. wide, often carinate, denticulate; sepals 5, imbricate, unequal, glabrous, ovate or rounded, 1–1.5 cm. long, the outer ones smaller, thicker, with a narrow ciliate membranaceous margin, the inner ones thickened at the center and base, the margin more widely membranaceous, eciliate; petals 5, imbricate, membranaceous, glabrous, ca. 20 mm. long, 5–6 mm. wide, with the over-all form of an hourglass, deeply constricted immediately below the middle to 2 mm. or less in width, the lower portions of the petals connate for 5–7 mm. simulating a tube but often separating at maturity, the uppermost portion of the petals broadly ovate, acute at the apex, appearing decidedly so because of the tendency to curve inward; stamens 30–40, uni- or bi-seriate, 12–15 mm. long, the filaments lightly adnate to the base of the corolla, ca. 5 mm. long, the anthers basifixed, linear, 5–7 cm. long, the connective projected into a conspicuous apicule 2–3 mm. long; ovary subinferior, 2- or 3-celled, with several ovules suspended from the apex of the placenta in each cell, the style tenuous 1.5–2 cm. long, 2- or 3-lobed at the apex, the stigmas 3. Fruit baccate, subinferior, free only at the apex, otherwise joined with the calyx-tube, somewhat leathery, usually pustular-dotted when mature, globular or rounded, ca. 2 cm. diameter (sometimes as much as 4 cm. long and 3 cm. diameter), crowned by persistent sepals, 2- or

3-celled, each cell 1-3-seeded. Seeds with a hard woody testa and reddish arillae, the embryo horseshoe-shaped.

**YUNNAN:** Kintung Chai, between Keng Hung and Muang Hing, top of dry slopes, alt. 1350-1800 m., *J. F. Rock 2703* (AA), Mar. 1, 1922 (tree). — Between Tengyueh and the Burmese border, en route to Sodom, *J. F. Rock 7314* (AA), Nov. 1922 (tree 30 ft.; flowers white, the pedicels white). — "Ad orientem fluminis Dsolin-ho humidis ad vicum Lodse-Magai," alt. 1900 m., *H. Handel-Mazzetti 6164* (AA), April 29, 1915. — Kien-shuei Hsien, woods, alt. 1900 m., *H. T. Tsai 53142* (AA), April 13, 1933 (tree 20 ft.). — Lung-ling Hsien, in thickets, alt. 1800 m., *H. T. Tsai 55629* (AA), 55768 (AA), 55855 (AA), April 1934 (tree 30 ft., fruit yellow). — Mong-ka, in forest, alt. 1600-1750 m., *H. T. Tsai 56722* (AA), 56840 (AA), 56846 (AA), Jan.-Feb. 1934 (tree 20-30 ft.; flowers yellow). — Yuanchiang, alt. 4000-5000 ft., *A. Henry 11591* (AA). — Szemao, eastern Mt., alt. 4000-5000 ft., *A. Henry 11591A* (AA), 11591C (AA). — Shun-Ning, Holungtan, among thickets, alt. 1850 m., *T. T. Yü 16195* (AA), June 10, 1938 (rare shrub 4-6 ft.; capsule woody, brownish yellow). — Shun-Ning Hsien, mountain slope, alt. 2800 m., *C. W. Wang 71812* (AA), Feb. 1936. — Chen-Kang Hsien, in woods, alt. 1600 m., *C. W. Wang 72227* (AA), March 1936. — Tsang-Yuan, north slope, alt. 1600 m., *C. W. Wang 73247* (AA), April 1936 (tree 15 m.). — Fo-Hai, alt. 1540 m., *C. W. Wang 73755* (AA), May 1936 (shrub 15 ft.). — Jah-kuang, Che-li Hsien, in thickets, alt. 1300 m., *C. W. Wang 79106* (AA), Sept. 1936. — Kuen-ger, Che-li Hsien, in thickets, alt. 1260 m., *C. W. Wang 79272* (AA), Oct. 1936. — Ban-chiou-chian, Che-li Hsien, thickets, alt. 840 m., *C. W. Wang 79763* (AA), 79770 (AA), Oct. 1936. — Meng-la, Jenn-yeh Hsien, mixed forest, alt. 1000 m., *C. W. Wang 80498* (AA), 80599 (AA), Nov. 1936. — Kuan-yeang, Luh-shuen Hsien, mixed forest, alt. 1180 m., *C. W. Wang 81161* (AA), Nov. 1936. — Without precise locality: *G. Forrest 9615* (AA), 27783 (AA).

**KWEICHOW:** Tuh-shan, in dense shade, *Y. Tsiang 6980* (AA), Sept. 8, 1930.

**KWANGSI:** Shang-sze District, southeast of Shang-sze, Kwangtung border, Shap Man Tsai Shan, near Iu Shan village, *W. T. Tsang 22227* (AA), May 7, 1933.

**KIANGSI:** Lungnan District, Oo Chi Shan, near Lam Uk Village, steep slopes in rocky forest, *S. K. Lau 4777* (AA), Oct. 1934 (tree 20 ft.).

**UPPER BURMA:** Taung-gyi, *F. G. Dickason 5880* (AA), May 5, 1933. — Toungu District, Thandoung, alt. 3200 ft., *F. G. Dickason 6791* (AA), Jan. 1938 (shrub 15 ft.). — Haka, semi-open hillside, alt. 6000 ft., *F. G. Dickason 7587* (AA), 7695 (AA), Apr. 1938 (tree 30 ft.). — Kachin Hills, *Shaik Mokim s.n.* (AA), Jan. 1898. — Ken Tung [Kiangtung] Territory, Muang Len Ridge, *J. F. Rock 2027* (AA), Jan. 24, 1922. — Fort Stedman, *Abdul Huk s.n.* (AA), Jan. 1893 (tree 100-150 ft.). — Madre Hills, *King's Coll. 174* (AA), Feb. 20, 1893 (tree 80 ft.).

**LOWER BURMA:** Amherst District, Kyain, common in scrub jungle, *F. G. Dickason 6882* (AA), Feb. 1938 (small tree 30 ft.). — South Tenasserim, in Zadi Circle, Jaungbyant forest, *Maung Po In 5611* (AA), Feb. 25, 1906.

**SIAM:** Phu Krading, Loie (N. E. Siam), common in open forests at summit, alt. 1000 m., *Native Collector DE329* (Roy. For. Dept. 4418) (AA), August 19, 1950.



INDO-CHINA: Laos: Sam-neua, *E. Poilane* 2074, Nov. 14, 1920.

*Anneslea fragrans* is a very variable species extending from southern China through Burma and Indo-China into Malaya. Several species have been described in the genus since Wallich first introduced the original *A. fragrans*.

After a careful study of material of this genus from all regions, one cannot help conclude that, with the exception of the isolated *A. donnaiensis* and *A. steenisii*, only a single species is represented, with regional variations — and these regional varieties not consistently distinct. A similar situation may be found in the single Asiatic species of *Cleyera*, namely *C. japonica*.

The center of distribution for the genus, as well as the species *A. fragrans*, appears to be Yunnan and Burma. Even in this area considerable variation may be found in leaf size and shape and pedicel length, as well as in number of cells in the ovary and the number of stigmas. It was on these characters that the species had been separated.

On the fringes of the distribution area may be found the regional varieties. On Formosa is var. *lanceolata*. This variety was later given specific status, but in a treatment by Keng in 1950 it was again recorded as a variety. In this variety the leaves are consistently narrower than the species and lanceolate, the peduncle short, and the fruit reportedly smaller. Narrow-lanceolate leaves may be found in the Yunnan material, but only occasionally. The same is true of the pedicel length.

An interesting observation on peduncle length can be found in a series of specimens collected by Tsai in Yunnan. Tsai's numbers 55768, 55629, and 53142 were collected on the same day, and the peduncles consistently measure 5.5–6 cm. in length. His numbers 56840, 56846, and 56722 were collected in the same locality and in these numbers the peduncles measure 3.5, 3.5, and 3.5–6 cm. in length. *Handel-Mazzetti* 6164 has fruiting peduncles measuring 2.5 cm. Study shows that the peduncles of a length of 5 and 6 cm. on the typical material, although outstanding, are actually less frequently found than those of the shorter measurements.

In Malaya the specimens are of a much sturdier appearance throughout. The peduncle is outstanding because of its short, thick character, as it measures as much as 5 mm. in diameter at the apex. This variety is well named *crassipes*.

Two closely allied varieties, *hainanensis* and *ternstroemioides*, are found in Hainan and Tonkin respectively. These are characterized by having smaller flowers on shorter pedicels. However, var. *ternstroemioides* has also much smaller leaves and shorter petioles. Gagnepain considered this variety a distinct species because of the two-celled ovary and two-lobed stigma. These characters are not distinctive. I have seen Gagnepain's type of *A. ternstroemioides* and feel that it is worthy of varietal status only.

The variety *alpina* is not a marginal or regional variety. It was collected in Yunnan and reported by the collector, Yü, as common. In his use of the word "common" Yü was probably referring to material typical of the species. Still only a single specimen of typical material seems to have been collected by him. *Anneslea alpina* was based on a very poor specimen. However, its rounded leaves and short petioles cannot be overlooked. Although specimens from Burma show leaves similar to var. *alpina*, the leaves on the Yü specimen are all rounded, while on the Burmese material the rounded leaves are only occasional.

Three specimens, one each from Kwangsi, Kweichow, and Kiangsi, are cited under the species. These three specimens increase the specific range somewhat along the southern area of China. The Kwangsi specimen, *Tsang 22227*, has lanceolate leaves very similar to those of var. *lanceolata*.

***Anneslea fragrans* Wallich var. *crassipes* (Hooker ex Choisy) Pierre, Flor. For. Cochinch. 2: t. 127. 1887.**

*Anneslea crassipes* Hooker ex Choisy in Mém. Soc. Phys. Hist. Nat. Genève 14: 129 (Mém. Ternstr. 41). 1855. — Dyer in Hooker f., Fl. Brit. India 1: 280. 1872. — Keng, Mater. Fl. Malay Penins. 1: 127. 1890. — Ridley, Fl. Malay Penins. 1: 193. 1922. — Melchior in Nat. Pflanzenfam. ed. 2, 21: 143. 1925.

*Anneslea monticola* Kurz in Jour. As. Soc. Bengal 42(2): 59. 1873; For. Fl. Brit. Burma 1: 98. 1877. — Mason, Burma People Prod. (Bot.) 2: 630. 1883.

*Anneslea fragrans* Wallich  $\beta$  *monticola* (Kurz) Pierre, Flor. For. Cochinch. 2: t. 127. 1887.

*Daydonia crassipes* (Hooker ex Choisy) Britten in Jour. Bot. 26: 11. 1888.

*Anneslea crassipes* Hooker ex Choisy var. *obovata* King, Mater. Fl. Malay Penins. 1: 127. 1890.

*Mountnorrisia crassipes* (Hooker ex Choisy) Szyszylowicz in Nat. Pflanzenfam. III. 6: 189. 1893.

MALAYA: Pahang: Cameron Highlands, Rhododendron Hill, alt. ca. 4800 ft., *M. R. Henderson 23321* (AA), April 2, 1930. — Cameron Highlands, alt. ca. 4000 ft., *M. R. Henderson 32671* (AA), April 16, 1937 (48 ft. to first branch). Penang: *Hooker s.n.* (G) in 1851. Perak: summit of Gunong Batu Pateh, alt. 6700 ft., *L. Wray 315* (AA). Without precise locality: *Griffith 741* (G) and *A. C. Maingay 181* (G).

This variety is characterized by an over-all sturdiness and is well named *crassipes*. Most characteristic is the stout sturdy pedicel measuring sometimes only 1.5–2 cm. long. In fruiting specimens these pedicels may measure as much as 5 mm. in diameter (*Wray 315*). In *Henderson 23321* and *32671*, two specimens collected in the same locality, variation in the pedicel character may be found. The earlier number has much thicker pedicels, especially at the apex, than *32671*. The latter number appears more closely related to the species.

***Anneslea fragrans* Wallich var. *lanceolata* Hayata, Icon. Pl. Formos.**

3: 42, t. 5. 1913. — Kanehira, Formos. Trees 55, fig. 1917. —

Melchior in Nat. Pflanzenfam. ed. 2, 21: 143. 1925. — Makino & Nemoto, Fl. Jap. 736. 1931. — Yamamoto in Sylvania 5: 32. 1934. — Keng in Taiwania 1: 254. 1950.

*Anneslea lanceolata* (Hayata) Kanehira, Formos. Trees, ed. rev. 455, fig. 412. 1936.

FORMOSA: Hunchuen Peninsula: *Matsuda* 16781 (photo, AA); *R. Kanehira* 7 (AA); *S. Sasaki* W10 (AA), Oct. 31, 1920.

This variety is separated from the species by its smaller fruits (ca. 1 cm. diam.), shorter pedicels, 2.5–3 cm. long, and consistently lanceolate to oblong-lanceolate leaves 10–13 cm. long and ca. 3 cm. wide.

The latest and probably the best treatment of this variety was furnished by Keng in Taiwania 1: 254. 1950. Unfortunately Keng compared this variety with material from Hainan only, thus dealing with *A. fragrans* var. *hainanensis* rather than with the species. In the latter named variety from Hainan, the fruit is larger, as are the leaves. However, both varieties are characterized by shorter pedicels.

The narrow lanceolate leaves are not distinctive of this variety alone, since material from Yunnan and Kwangsi show the same type of leaf. The leaves of *Forrest* 9615 measure ca.  $9 \times 2.5$  cm. and are all similar. However, on *Tsai* 53142 there are lanceolate leaves measuring ca.  $12 \times 3.5$  cm., very similar to those of var. *lanceolata*. On the same specimen may be found wider leaves, less acute at the apex and more typical of the species. Both the above specimens were collected in Yunnan. *Tsang* 22227, collected in Kwangsi, bears leaves similar to this variety, measuring  $10 \times 2.8$  cm. and  $8.5 \times 2.2$  cm. Others, however, measure  $11 \times 4$  cm. All are acute at the apex.

VERNACULAR NAME: *Nagaba-mokkoku* (Japanese).

***Anneslea fragrans* Wallich var. *hainanensis*, var. nov.**

A varietate *ternstroemioides* differt foliis maioribus, ad 15 cm. longis et 5–6 cm. latis, obovatis, apice rotundatis vel obtusis rare late acuminatis, petiolis ad 3 cm. longis; filamentis 2–3 mm. longis, antheris 4 mm. longis, acumine ca. 2 mm. longo; ovario 2- vel 3-loculato, stigmatibus 2 vel 3.

HAINAN: Dung Ka to Wen Fa Shi, in thickets, alt. 2000 ft., *N. K. Chun* & *C. L. Tso* 43792 (AA), 1932–33 (tree 20 m.; seeds red). — Po-ting, in forest, alt. 2800 m., *F. C. How* 72915 (AA), June 16, 1935 (tree 10 m. with gray bark; leaves dark green above, pale green beneath; fruit yellow-green). — Without precise locality: *H. Y. Liang* 64168 & 64223 (AA); *C. Wang* 35183 (AA).

KWANGTUNG: Wung Yuen District: Fan Shiu Shen, steep slopes of rocky forest, *S. K. Lau* 2743 (AA), Nov. 1933 (tree 10 m.).

This variety is characterized by small lanceolate leaves 4.5–7 cm. long, 2–3 cm. wide, with the petioles ca. 1 cm. long, the pedicels short, 2–3 cm. long, the filaments short, 2–3 mm. long, and the ovary usually two-celled and the stigmas two in number.

Except in the shape and size of the leaves this variety very much



resembles var. *ternstroemioides* from Indo-China. Both varieties have smaller flowers on shorter pedicels than those found in typical *A. fragrans* and the other varieties. In the stamens of both varieties the filaments are very short (not over 2–3 mm.) appearing almost bulbous in shape, while in other members of the species the filaments are usually approximately 5 mm. long.

***Anneslea fragrans* Wallich var. *ternstroemioides* (Gagnepain), comb. nov.**

*Anneslea ternstroemioides* Gagnepain in Notulae Syst. (Paris) **10**: 116. 1941; in Fl. Gén. Indo-Chine Suppl. **1**: 278. 1943.

INDO-CHINA: Tonkin: Massif du Tam-dao, alt. ca. 1400 m., A. Pételot 3869 (TYPE of *A. ternstroemioides*, Paris), Dec. 1930.

This variety is characterized by lanceolate leaves far smaller than those of the species or any of the other varieties, being 4.5–7 cm. long, 2–3 cm. wide with a petiole seldom measuring over 1 cm. long. The pedicels are short (2 cm. long). The filaments are very short (ca. 1 mm. long) and only one-fifth the length of the anthers. The ovary is two-celled and the stigmas number two.

It is most closely allied to var. *hainanensis*, which differs in having larger leaves (up to 15 cm.  $\times$  6 cm.) with petioles as much as 3 cm. long. However, in the inflorescence there is close agreement between the two varieties.

The two-celled ovary and two stigmas of var. *ternstroemioides* may not prove to be consistent characters. Only a single specimen, the type, has been collected to date.

Originally described by Gagnepain as *A. ternstroemioides*, it was separated from *A. fragrans* primarily on the two stigma lobes, the shorter sepals, and the size of the leaf. I find the short bulbous filaments and the short-petioled leaves more distinctive characters, and it is on the basis of these that I separate it from *A. fragrans* as a variety.

VERNACULAR NAMES: *Brol*, *Cây la chua*, *Reung*, *Ko nang na*.

***Anneslea fragrans* Wallich var. *alpina* (Li), comb. nov.**

*Anneslea alpina* Li in Jour. Arnold Arb. **25**: 307. 1944.

YUNNAN: Mien-ning, Po-shang, common in forest, alt. 2700 m., T. T. Yü 18031 (TYPE of *A. alpina*, AA), Oct. 11, 1936 (shrub 8–12 ft. high with pinkish red flowers).

This variety can be separated from the species by its smaller ovate to suborbicular leaves (4–6 cm. long, 3–4 cm. wide) with the short petioles only 5 mm. long.

The specimen cited above, Li's type for *A. alpina*, is very poor. No flowers were attached and all pedicels were broken off. The exact measurements could not be given. Li's measurement of 1–1.5 mm. is a mechanical error, of course. He probably meant to say 1–1.5 cm. Even this is not correct, since one pedicel (in packet) measures over 2 cm. long, and this one is broken off at the base.

The small ovate leaves are rather distinct from those of other specimens from this region which have been studied. *Dickason* 7587 from Upper Burma has rounded leaves  $5 \times 2.5$  cm. with petioles 1 cm. long. However, on the same specimen are longer leaves, more acute, and typical of the species. On the Dickason specimen the pedicel measures over 5 cm. in length.

## 2. *Anneslea steenisii*, sp. nov.

Arbor ?; ramulis verticillatis subverticillatisve, brunneis vel griseis, teretibus, glabris; foliis coriaceis, paucis ad apicem ramulorum dispositis, glabris, oblongo-ellipticis vel obovatis, apice acutis vel obtusis, basi attenuatis, subtus punctatis, margine subrevolutis, subintegerrimis, costa supra canaliculata, subtus elevata, venis ca. 8–10 paribus conspicuis vel subconspicuis, supra leviter impressis, subtus elevatis, petiolis 1 cm. minusve. Flores ad apicem ramulorum leviter spirali-terque dispositi; pedicellis crassis, recurvatis, 1.5–2 cm. longis, ca. 4 mm. diametro, glabris, teretibus, rare ancipitibus; bracteolis 2, oppositis suboppositisve, subaequalibus, crasso-coriaceis, subrotundatis vel late deltoideis,  $3 \times 3$  mm.,  $4 \times 4$  mm., ad  $6 \times 6$  mm., glabris; sepalis 5, imbricatis, inaequalibus, subrotundatis, glabris, exterioribus duobus crassioribus, 7–12 mm. longis, 9–12 mm. latis, interioribus tribus leviter latioribus, ad  $15 \times 15$  mm., margine plus minusve scariosis; petalis 5, basi leviter connatis, obovatis, 12–13 mm. longis, 7–10 mm. latis, margine integris vel subintegris non constrictis; staminibus ca. 35, 2-seriatis, glabris, apice in apiculum 1 mm. longum projectis, filamentis basi ad corollam adnatis, crassis 3–4 mm. longis, antheris elongatis, ca. 4–5 mm. longis; ovario glabro, subplano, 2–(vel 3-) loculari, stylo glabro, attenuato, ca. 1.3 cm. longo, apice 2–(vel 3-) partito, non recurvato. Fructus globosi, glabri, sublepidotis obtecti, 4–5 cm. longi, ad 3 cm. diametro, apice persistentibus sepalis coronati, 2–(vel 3-) loculares, duobus vel tribus seminibus in quoque loculo; seminibus ca. 1 cm. longo, 3–4 mm. diametro.

SUMATRA: Atjeh: Gajolanden: Poetjoek Angasan, common in the ridge forest above Penosan, alt. 2300 m., *C. G. J. van Steenis* 8327 (Herb. Bogor.), Jan. 27, 1937. — Mt. Losir, on watershed between bivouacs 4 and 5, near stream in the forest, alt. 2700–2800 m., *Van Steenis* 8493 (Herb. Bogor.), Jan. 31, 1937. — Mt. Kemiri, in scrub at the summit on east side of Camp at Aloer, alt. 2850–3300 m., *Van Steenis* 9685 (Herb. Bogor., TYPE), March 10, 1937. — Near junction of Kapi and Aoenan Rivers near Paja camp, flat forest ridges near sulphur field, *Van Steenis* 9964 & 9981 (Herb. Bogor.), March 21, 1937.

Included in a loan of specimens of *Adinandra* and *Ternstroemia* from Herbarium Bogoriense were the five specimens cited above. The arrival of this material considerably upset the rest of this paper, which had already been prepared for publication. Until these specimens came to light the genus was supposed to occur only as far south as the Malay Peninsula. From a general examination it was thought at first that

the above Sumatran material would prove to be only an extension of the range of *A. fragrans*, perhaps another variety with very large fruit. However, characters discovered in the flowers, as well as those in the fruit, showed that a new species should be designated.

The petals in *A. steenisii*, like those of *A. donnaiensis*, lack the "hour-glass" shape of *A. fragrans* but are obovate without the single constriction along each side. Also the petals are joined only lightly at the base rather than connate for 5–7 mm. as in *A. fragrans*, and measure only approximately one-half the length of those of the mainland species. The stamens measure slightly less in length than those of *A. fragrans*. In *A. steenisii* the partitions of the style, although either two or three in number, are erect rather than spreading as in *A. fragrans*.

The fruit of this species is far larger than any previously seen for the genus, measuring as much as 5 cm. in length and 3 cm. in diameter. The walls of the fruit are very thick, measuring 5 mm. or more. The seeds, one centimeter or more in length, are correspondingly large.

In the mature fruit examined (*Van Steenis 9981*), the bracteoles had disappeared, only the scars remaining. The measurement of the scar showed the bracteoles at full maturity to have measured as much as 9 mm. across at the base. In general the bracteole measurements even in the young flowers were considerably more than those found in *A. fragrans*. The above description of the fruit was drawn from *Van Steenis 9981*.

It is a pleasure to name this species after C. G. G. J. van Steenis, the collector and my close friend.

VERNACULAR NAME: *Kajoe gaboe*.

### 3. *Anneslea donnaiensis* (Gagnepain), comb. nov.

*Paranneslea donnaiensis* Gagnepain in Bull. Soc. Bot. France **95**: 29. 1948, as *P. donnalensis*.

Trees 20–30 m.; branchlets terete, subverticillate, glabrous, gray. Leaves coriaceous, glabrous, subverticillate, few, disposed at the apex of the branchlets, obovate to oblanceolate, 7–15 cm. long, 3–5 cm. wide, obtuse at the apex, bluntly acuminate, attenuate at the base, slightly decurrent, the margin entire, the midrib canaliculate above, elevated below, the veins 6–8 pairs inconspicuous on both surfaces, the petiole 2–2.5 cm. long. Flowers solitary, axillary, subverticillate; peduncles terete, glabrous, 3–3.5 cm. long, somewhat thickened at the apex; bracteoles 2, persistent, opposite, immediately below the calyx, unequal, broadly ovate to deltoid, ca. 3 mm. long, 2–3 mm. wide; sepals 5, imbricate, unequal, glabrous, obovate to rounded, the outer ones 5 mm. long, the inner ones 15 mm. long; petals 5 [fide Gagnepain], orbicular, strongly concave, 12 mm. diameter in the bud; stamens very numerous, free, 7 mm. long, glabrous, the anthers basifixed, 5 mm. long, linear, bi-mucronate at the apex, 2-celled, the cells unequal, the filaments short, 2 mm. long, flattened; the ovary immersed at the base in the



torus, pyramidal, 5 mm. long, 2-celled, 5-lobed at the apex, the stigmas [5] obtuse, erect, the ovules 2 to each cell, pendulous from the top of the placenta. Fruit baccate, subinferior, free only at the apex, otherwise joined with the calyx-tube, leathery, usually pustular dotted, globular or rounded, 2 cm. diameter, crowned by the persistent sepals, 2-celled, each cell 2-seeded. Seeds with a woody testa, covered with (reddish ?) arillae.

INDO-CHINA: Annam: Prov. Ht. Donnai; between Dang-kie and Yonglé, *E. Poilane 23425* (AA), January 28, 1934. — Brañan, near Djiring, alt. 1200 m., *E. Poilane 24470* (Paris, SYNTYPE of *Paranneslea donnaiensis*), Feb. 22. 1935.

A syntype of *Paranneslea donnaiensis* was borrowed from the herbarium of the Paris Museum in the hope of studying the floral structure. However, since only a single flowering bud was found attached to the specimen, I decided to rely on Gagnepain's notes for the above description of petals, stamens, and ovary, rather than remove the bud.

Gagnepain's description was obviously drawn from the bud rather than from open or mature flowers. The petals may be similar in shape to those of either *A. fragrans* or *A. steenisii*. I assume from the description that "orbicularia . . . in alabastro 12 mm. diam." refers to the shape and size of the bud rather than the individual petals. No reference to a style of any sort was made by Gagnepain. Gagnepain seems dubious about the number of ovules in each cell, citing two. This number may vary, possibly, as it does in *A. fragrans* and *A. steenisii*.

Examining the above cited fruiting specimen (*Poilane 23425*), there is no obvious character to remove it from *A. fragrans* except the solitary arrangement of the fruit in the axils of the leaves. This same specimen was available to Gagnepain in the Paris Herbarium, since he earlier cited it (*Fl. Gen. Indochine Suppl. 1: 278. 1943*) as *A. fragrans*.

Up to the present time the fruit has not been described. In the above description, details for the fruit were taken from *Poilane 23425*, a specimen collected close to the type locality.

All the fruits dissected for this study showed two well-developed cells with two mature seeds in each cell measuring ca. 12 mm. in length and 5-7 mm. across. As mentioned earlier in this paper, the bi-mucronate anthers, the five pistils, and the solitary axillary pedicels constitute the principal differences separating this species.

The specific name appeared only once in Gagnepain's publication and was printed "*donnalensis*." Since the name is obviously derived from the Province Ht. Donnai, I presume the spelling *donnalensis* is a mechanical error, and I have here corrected it to *donnaiensis*.

ARNOLD ARBORETUM,  
HARVARD UNIVERSITY.

ERIANDRA, A NEW GENUS OF POLYGALACEAE  
FROM NEW GUINEA<sup>1</sup>

P. VAN ROYEN AND C. G. G. J. VAN STEENIS

*With one plate*

AMONG THE UNIQUE COLLECTIONS made by Mr. L. J. Brass on the Archbold Expeditions to New Guinea, we found a most remarkable plant which had been sent to this herbarium under the provisional name *Sideroxylon*. An examination of the characters convinced us that it is closely related to *Diclidanthera*, *Moutabea*, and *Barnhartia*, three genera of the Polygalaceae known only from South America. From a plant-geographical standpoint this is most remarkable, but this type of distribution is by no means unique though still exceptional and interesting.

The group of American genera has a chequered taxonomical history which we need not recall here, since it has been done previously by other authors (O'Donell, Erdtman, Sandwith & Sprague).

In comparing the four genera it appears that they show a reticulate affinity, i.e., their conformity is different when different characters are chosen for comparison.

The four genera are either trees (*Eriandra*) or shrubs, while the leaves are spirally arranged<sup>2</sup> and entire. The inflorescences are either axillary or terminal. In comparison with the other three genera *Eriandra* is pauciflorous.

The leaves of *Eriandra* have a light greenish yellow colour when dried, reminiscent of some species of *Xanthophyllum*, which influenced the senior author in giving as sight determination: "a *Xanthophyllum* with regular flowers." This yellowish colour is often due to the presence of a certain amount of aluminium, and since according to Chenery (1948) the other three genera belong to the aluminium-containing plants, it is reasonable to assume that *Eriandra* belongs to the same group.

In the absence of glands on the leaves, petioles, bracts, and bracteoles, *Eriandra* differs from the other three genera.

The calyx in *Eriandra* is 4- or 5-merous and 5-merous in the other three genera. The corolla is 5-merous in the four genera, actinomorphic in *Diclidanthera* or subactinomorphic in *Eriandra*, subzygomorphic in *Barnhartia*, and zygomorphic in *Moutabea*. The zygomorphy in

<sup>1</sup> Results of the Richard Archbold Expeditions.

<sup>2</sup> The term "alternate" as used by Sprague & Sandwith to indicate the spiral phyllotaxis in *Barnhartia* seems less preferable in botanical terminology. In all four genera of the Moutabeae the leaves are spirally arranged.

*Moutabea* is partly due to the boat-shaped lower petal and the zygomorphic androecium. The subzygomorphy in *Barnhartia* is determined by the absence of two or three stamens and to the (very weak) union of four petals in two pairs. Gleason (1926) points out that the slight connation of the paired petals is facilitated by their approximation on the margin of the hypanthium away from a normal position alternate with the sepals; thus one might conclude that a slight zygomorphy is also found in this shifting of the petals.

The petals in *Eriandra*, *Moutabea*, and *Diclidanthera* are united into a tube and are free in the apical parts only, but in *Barnhartia* the five petals are free, four of them cohering in two pairs. In *Moutabea*, however, the tube is deeply incised at the dorsal side.

In *Eriandra*, *Diclidanthera*, and *Moutabea* the eight or ten stamens are united into a single column which is united with the corolla, but in *Barnhartia* the seven or eight stamens are inserted on the petals but never united into a tube. In *Moutabea* this tube is open at the dorsal side.

In the four genera the anthers dehisce with one tangential slit, a character which is otherwise not found in the Polygalaceae.

On the structure of the pollen we have a report by Dr. G. Erdtman, Director of the Palynological Laboratory at Stockholm, to whom we sent some material and who, in 1944, examined the pollen of *Diclidanthera*. He pointed out that the pollen closely resembled that of *Xanthophyllum*, *Salomonina*, and *Polygala*. We investigated the pollen grains of *Barnhartia floribunda* Gleason, and as our drawing shows, it is closely related to *Diclidanthera* and to *Eriandra*. The pollen grains of *Eriandra fragrans* are slightly constricted at their equator, and in the opinion of Dr. Erdtman this character may be seen as an evidence in favour of the distinction of a new polygalaceous genus. His pollen diagnosis, which he kindly put at our disposal, runs: "pollen grains 8-9-colporate (zonate), prolate spheroidal ( $30 \times 28\mu$ ) slightly constricted at their equator. Sexine probably thicker than nexine; OL pattern (faint; can be seen at least near the equator)."

The ovary of *Eriandra* is 7- or 8-celled, that of *Diclidanthera* 5-celled (fruit 5-7(!)-celled), *Moutabea* 4- or 5-celled (fruit 2-5-celled), and that of *Barnhartia* 2- or 3-celled. In all cases the cells contain one pendulous ovule.

The styles are densely pubescent in *Eriandra*, *Barnhartia*, and *Diclidanthera*, but glabrous in *Moutabea*.

The stigmas are capitate, papillate in *Eriandra*, *Diclidanthera*, and *Barnhartia*, but subquinelobate to bilabiate and slightly infundibuliform in *Moutabea*, as is clearly shown in Miquel's drawing in the *Flora Brasiliensis* 7: pl. 5, f. 13 and 14. The authors found a bilabiate stigma.

According to Chodat (1897) and Oort (1932) a disk seems to be present in *Moutabea*. However, neither in Aublet's description (1775)



nor in the one given by Miquel (1856) is there a disk represented. We could not find the slightest indication of this character.

Considering the details given above, the proper place of *Eriandra* is in the Polygalaceae in the affinity of *Barnhartia*, *Moutabea*, and *Diclidanthera*, to the last of which it is most closely related. The four genera are best placed together in the tribe Moutabeae. Arranged according to affinity with the tribe Polygaleae *Barnhartia* seems to come first, followed by *Moutabea*, whilst *Eriandra* and *Diclidanthera* show the least relationship. The four genera form a series of genera running from zygomorphic to actinomorphic and from choripetalous to gamopetalous flowers. Related to this last character is the uniting of the stamens, which are free in *Barnhartia* and form a staminal tube in *Diclidanthera* and *Eriandra*. *Moutabea* forms an intermediate stage, as the eight stamens are united into two bundles, though still in one tube which is open at the dorsal side. •

As the characters of the Moutabeae given by Chodat (1897) have to be emended to include the four genera, we propose to give the following definition of this tribe:

### Tribe **Moutabeae**

Calyx and corolla united at the base on a torus. Calyx united. Corolla free, cohering or united, quincuncial in bud. Stamens 7, 8 or 10, united into a tube or free and inserted on the free petals, sometimes in two bundles. Anthers dehiscing with one tangential slit. Carpels 2-8, united, with one ovule in each cell. Trees or shrubs with entire, spirally arranged leaves.

Four genera with ten species, in South America and New Guinea.

### KEY TO THE GENERA

1. Stamens 8 or 10, connate in a tube.
  2. Calyx 5-merous, quincuncial in bud. Anthers glabrous. Ovary 5-celled. Base of bracts and base of leaf-margin provided with a gland ..... *Diclidanthera* Martius.
  2. Calyx 4-merous, decussate or 5-merous, quincuncial. Anthers densely pubescent. Ovary 7- or 8-celled. Glandless ..... *Eriandra* nov. gen.
1. Stamens 7 or 8, either in 2 bundles or not connate in a tube.
  3. Flowers markedly zygomorphic. Corolla tubular, splitting at the dorsal side. Upper 2 stamens absent, the others in two bundles of 4. Anthers transversely ellipsoidal. Ovary 4- or 5- celled, style glabrous, stigma sub-5-lobed and subinfundibuliform or bilabiate. Leaf-blade and petiole glandless ..... *Moutabea* Aublet.
  3. Flowers subzygomorphic. Petals connivent, not united. Stamens inserted on the petals, not united into a tube. Anthers longitudinally ellipsoidal. Ovary 2- or 3-celled, style densely pubescent, stigma discoid-capitate. Apex of the petiole with a gland on either side. .... *Barnhartia* Gleason.

**Eriandra** gen. nov.

Arbor parva, foliis spiraliter ordinatis petiolatis integris; racemis axillaribus parvis paucifloris; floribus epigynis actinomorphae subzygomorphae; sepalis 4 vel 5 decussatis vel quincuncialibus, basi connatis; petalis 4 vel 5 pro  $3/4$  longitudinis connatis in tubum calyci adnatum, apice tantum liberis; partibus liberis decussatis vel imbricatis orbicularibus; staminibus 8 vel 10 coalitis in tubum corollae adnatum, nunc uno latere paululo exsculptum; antheris transverse ellipsoideis, fissura communi transversa dehiscentibus; valvis 2, dense longeque pilosis; pollinis granulis in 8-vel 9-colporatis; ovario globoso glabro, 7-vel 8-loculari; loculis omnibus uniovulatis; stylo dense piloso; stigmate discoideo-capitato, papillato; fructu adhuc ignoto.

TYPUS: *E. fragrans*.

**Eriandra fragrans** sp. nov.

Arbor parva corona umbrosa instructa; trunco irregulariter et profunde sulcato (truncum spurium Ficorum epiphyticarum nonnullarum in mentem revocante): ramulis glabris; internodiis 0.5–2.5 cm. longis; foliis ellipticis oblongisve basi anguste cuneatis apice acutis 15–20 cm. longis 5–7 cm. latis coriaceis, utraque facie subnitentibus et glabris sed in facie inferiore costae mediae interdum pilis paucis raris conspersis; costa media subtus prominente, in facie superiore basi subcanaliculata, apice prominente; nervis lateralibus utroque latere costae mediae 12–16, subtus distincte prominentibus, supra prominulis; margine revoluta; petiolo supra appanato, parte inferiore rugoso, 1–2.5 cm. longo; floribus albis fragrantibus; racemis circ. 1 cm. longis; pedunculo communi breviter piloso, circ. 6 mm. longo; bracteis bracteolisque cymbiformibus obtusis; bracteis dense pilosis circ. 1 mm. longis; bracteolis subglabris circ. 0.5 mm. longis pedicellis 1–5 mm. longis, glabris; sepalis spathulatis obovatisve, 4–5.5 mm. longis, utrimque glabris, exterioribus margine toto, inferioribus parte apicali tantum fimbriatis; partibus petalorum liberis circ. 3 mm. longis, praeter margines fimbriatos glabris, in sicco rubiginosis; tubi staminei membranacei parte libera extus glabra, intus pilosa; antheris circ. 0.8 mm. latis; pollinis granulis plus minusve  $30\mu$  longis, ca.  $28\mu$  crassis; ovario plus minusve 2 mm. diametiente; stylo 3–4 mm. longo.

TYPE: *L. J. Brass 7767* in L, duplicate in A.

PAPUA: Western Division, Lake Daviumbu, Middle Fly River, rain forest, *Brass 7767* (TYPE in L; duplicate in A), Sept. 1936 (common small canopy tree; whole length of trunk deeply indented and flanged, like some strangling figs. Flowers white, fragrant).

NETHERLANDS NEW GUINEA: Mt. Arfak, Putat, *Beccari 9928* (in herb. Firenze), anno 1872 (loose flowers).

The name *Eriandra* is chosen on account of the pubescent anthers, while the specific epithet is used because of the fragrant flowers.

## BIBLIOGRAPHY

- AUBLET, F.: Pl. Guy. Fr. **2**: 679-680; **4**: 274. 1775.  
 BAILLON, H.: Hist. Pl. **5**: 76-77. 1874.  
 CHENERY, E. M.: in Kew Bull. **1948**: 175. 1948.  
 CHODAT, R.: in Mém. Soc. Phys. Hist. Nat. Genève. 1891, 1893.  
 ———: in Engler & Prantl, Nat. Pfl. Fam. **3**, **4**: 323-345. 1897.  
 ERDTMAN, G.: in Bot. Not. **1944**: 80-84. 1944.  
 GILG, E.: in Bot. Jahrb. **40**: Beibl. **93**: 81. 1908.  
 ———: in Engler & Gilg, Syllabus Pfl. Fam. ed. 9/10, 323. 1924.  
 GLEASON, H. A.: in Bull. Torr. Bot. Cl. **53**: 297-299. 1926.  
 HALLIER, H.: Ueber Juliania etc. **46**: 193. 1908.  
 ———: in Meded. Rijksherb. Leiden **1**: 36. 1910.  
 ———: in Arch. Néerl. Sc. Exact. Natur., sér. 3, B, **1**: 73. 1912.  
 MIQUEL, F. A. G.: in Mart. Fl. Bras. **7**: 11-16, *pl. 4-6*. 1856.  
 O'DONELL, C. A.: in Lilloa **6**: 207-212, *pl. 1 & 2*. 1941.  
 OORT, A. J. P.: in Pulle, Fl. Suriname **2**<sup>1</sup>: 424-425. 1932.  
 SOLEREDER, H.: Syst. Anat. Dicotyledonen **110**, 587-588. 1899.  
 SPRAGUE, T. A. & SANDWITH, N. Y.: in Hooker's Icon. Pl., ser. 5, **2**: *t. 3172*, pp. 1-3. 1932.

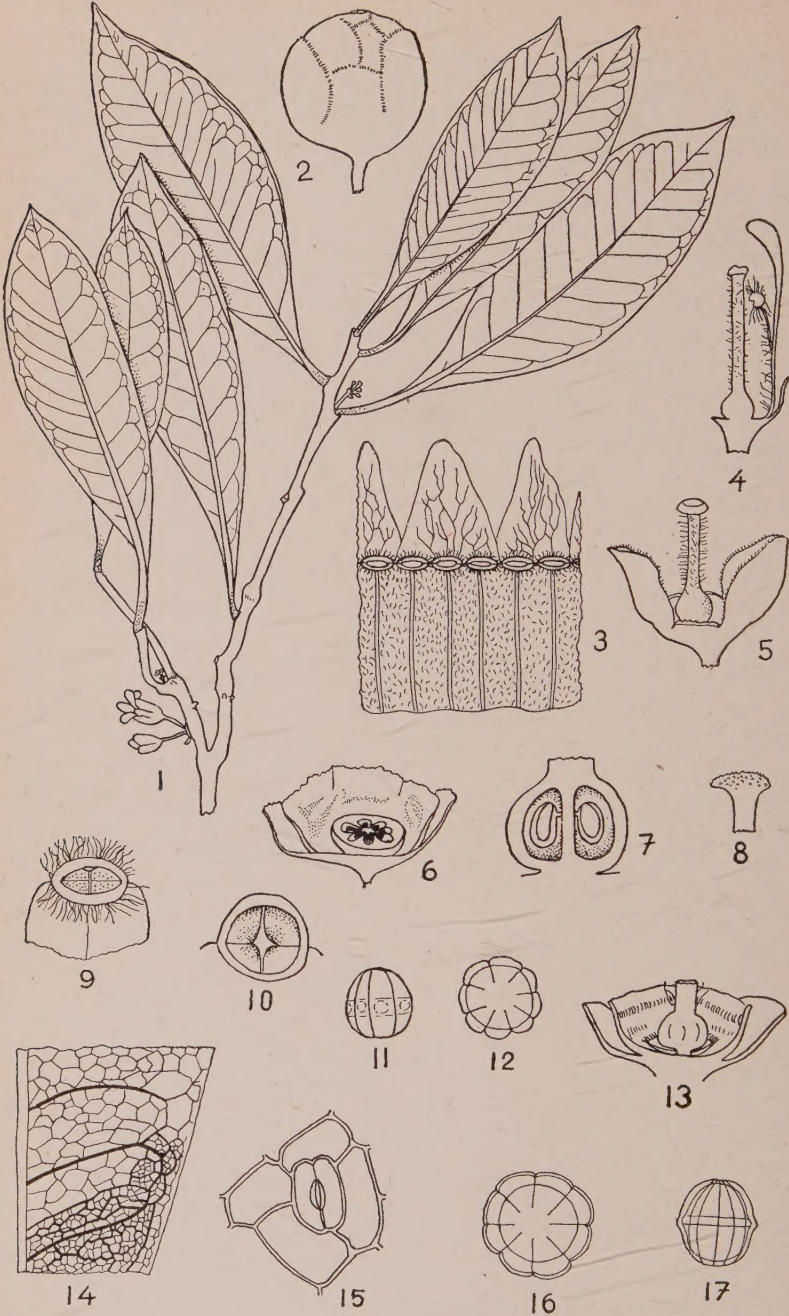
## EXPLANATION OF PLATE

## PLATE I

*Eriandra fragrans* Van Royen & Van Steenis (*Brass 7767*): 1. habit,  $\times 1/3$ ; 2. bud; 3. part of corolla from inner side, flattened; 4. longitudinal section of flower (schematic); 5. flower with 2 sepals, corolla and androecium removed; 6. base of flower with cross-section of ovary; 7. longitudinal section of ovary; 8. stigma; 9. anther; 10. ditto, showing the vertical septum; 11-12. pollen grains; 13. basal part of flower in section; 14. detail of leaf-nervation, underside; 15. stomatal apparatus. *Barnhartia floribunda* Gleason: 16-17. pollen grains. Except in fig. 1 all details enlarged.

RIJKSHERBARIUM,  
 LEIDEN, NETHERLANDS.





ERIANDRA FRAGRANS VAN ROYEN & VAN STEENIS





**RECENT PUBLICATIONS OF THE  
ARNOLD ARBORETUM**

- JOHNSTON, I. M.** *The Botany of San Jose Island (Gulf of Panama)*. Sargentia VIII. Pp. 1-306, with seventeen plates and two text-figures. April 22, 1949. .... \$6.00
- REHDER, ALFRED.** *Bibliography of Cultivated Trees and Shrubs*. Pp. i-xl, 1-825. 4°. June 14, 1949. .... \$20.00
- MERRILL, ELMER D.** *Index Rafinesquianus*. Pp. i-vi, 1-296. 4°. August 8, 1949. .... \$10.00
- 

Make checks payable to the **ARNOLD ARBORETUM**.